Dec. 15, 1925. 1,565,718

E. DORMAN

SAFETY DEVICE FOR OIL WELLS

Filed Dec. 31, 1923 2 Sheets-Sheet 1

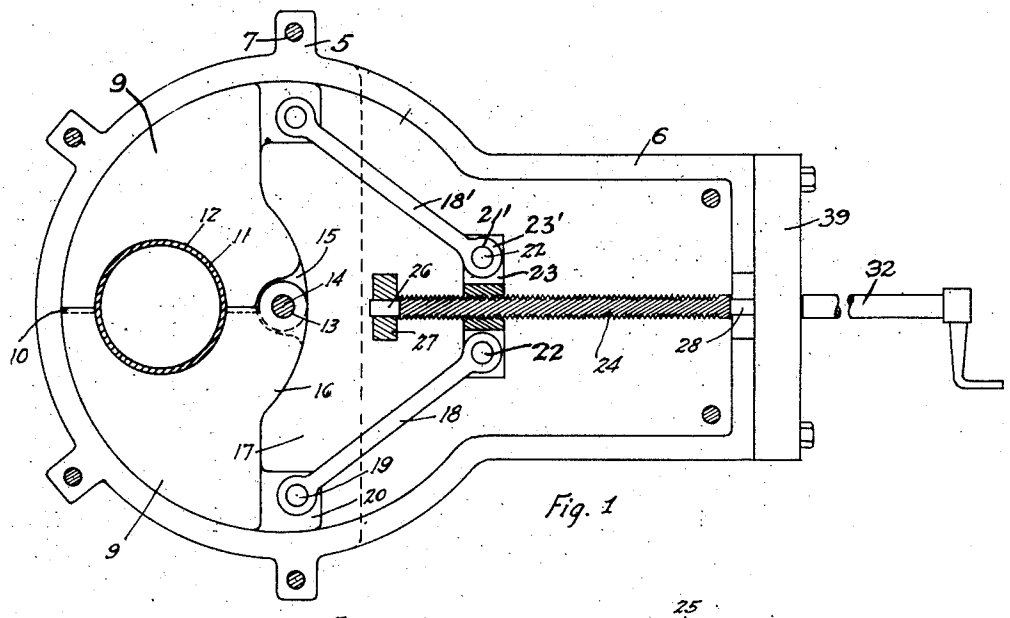


Fig. 1

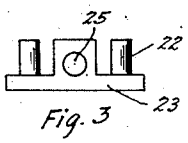


Fig. 3

Fig. 2

Ed. Dorman Inventor:

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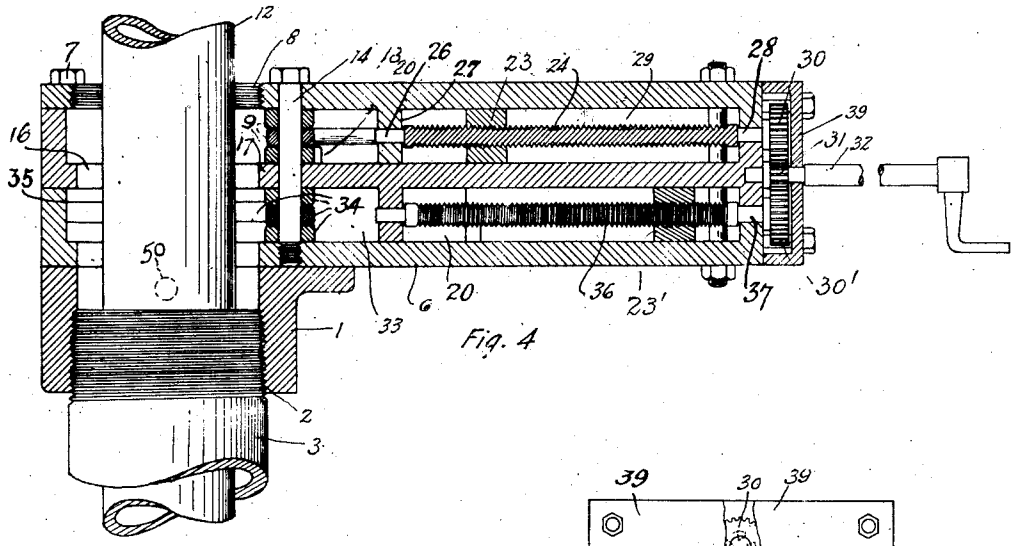


Fig. 4

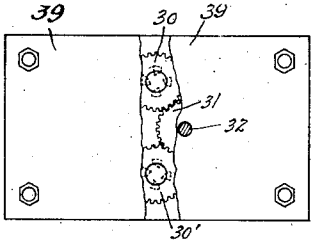


Fig. 5

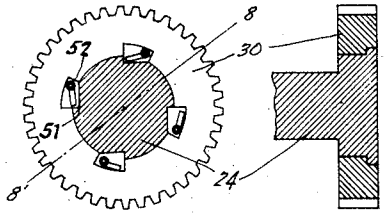


Fig. 6

Fig. 8

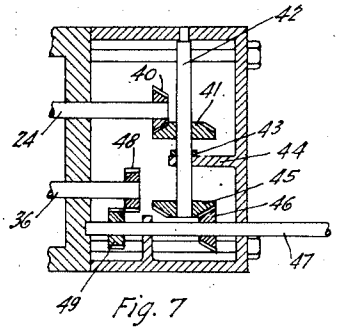


Fig. 7

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Patented Dec. 15, 1925. 1,565,718

UNITED STATES PATENT OFFICE.

EDWARD DORMAN, OF HOUSTON, TEXAS.

SAFETY DEVICE FOR OIL WELLS.

Application filed December 31, 1923. Serial No. 683,689.

To all whom it may concern:

Be it known that I, EDWARD DORMAN, a citizen of the United States, residing at Houston, Harris County, Texas, have invented a certain new and useful Improvement in Safety Devices for Oil Wells, of which the following is a specification.

My invention relates to a safety device for use on the upper end of the casing employed in oil wells, said device being designed to shut off the flow of oil from the casing either when the drill stem is in the well, or when it is removed.

An object of the invention is to provide a means for closing the upper end of the casing in case of a blow-out, and it is particularly desired to operate the device for this purpose from a distance in case of fire.

It is another object of the invention to so construct the device that it may be easily operated to close the well entirely where the drill stem has been removed, or to close the space outside of the drill stem where the drill stem is being employed.

Other objects and advantages, and the means whereby they are secured, will be more fully set forth in the specification which follows:

Referring to the drawing herewith, Fig. 1 is a top plan view of the upper valve and its operating means, the rod and the nut thereon being shown in horizontal section. Fig. 2 is a similar view of the lower valve with certain parts in section for greater clearness. Fig 3 is a front elevation of the threaded block by means of which the valves are operated. Fig. 4 is a central vertical section through the valves and their housing shown as attached to the casing. Fig. 5 is a broken front view of the gear housing, Fig. 6 is a detailed view illustrating the connection between the gears and their shafts. Fig. 7 is a central vertical section through a gear housing which may be substituted for that shown in Fig. 4, and Fig. 8 is a section on the line of 8—8 of Fig. 6. Like numerals of reference designate like parts in all views.

In carrying out my invention, I secure in the casing at a point just above the ground a housing for two separate valve members by means of which the upper end of the casing may be closed when desired. The housing is mounted upon a nipple or coupling 1 having a threaded socket 2 by means of which it is screwed upon the upper length of casing 3. This nipple as shown in Figs. 1 and 2, is of larger diameter above the casing than in the said casing, and is flattened along one side 4, as shown in dotted lines. The radial lugs 5 on the outer margin of the nipple are adapted to register with similar lugs upon the housing 6 above the nipple, and bolts 7 passing through these registered lugs are adapted to secure the housing firmly upon the nipple. The upper end of the housing is formed with a threaded opening 8 therein, by means of which a shorter length of casing may be secured thereon, as desired.

I desire to use my invention to shut off the flow of oil or gas from a well where it has blown in suddenly and it is particularly desired to operate the device where the well has caught fire as it blows in. If the drill stem has not been removed from the well at the time of the blow-out, and also if the force of the blow-out does not itself remove the drill stem, I provide an upper valve to close the casing within the housing about the drill stem. This valve and its operating means is shown particularly in Fig. 1. There are two sector-shaped plates 9 adapted to interfit at 10 when closed. Each plate has on its face adjacent the other plate, a semi-cylindrical opening 11 to fit about the particular size of drill stem 12 which is employed. These plates are pivoted at 13 upon an upright pin or shaft 14 extending vertically through the housing. As shown in Fig. 4, one of the plates has its pivoted end reduced in diameter at 15 to fit between the forked end of the other plate so as to form a hinged connection between the two valve plates. These plates are operated to close an opening 16 in the partition 17 of the housing by means of two links or arms 18, 18′ pivoted at one end 19 to a lug 20 upon the valve plate and having a pivotal connection at 21 at its other end to a pin 22 upon a threaded nut or block 23 or 23′, the construction of which is shown particularly in Fig. 3. The nut or block 23 is moved toward or away from the pipe 12 to open or close the space above the opening 25 in the nut, and has a bearing 26 on its inner end which is rotatable within a stationary block 27 secured to the housing as shown

in Fig. 4. The outer end of the shaft has a bearing at 28 within the outer end of the chamber 29 extending laterally from the casing.

The outer end of the said shaft has thereon a gear 30 adapted to mesh with an operating gear 31 mounted upon a crank shaft 32. It is desired that the shaft 24 upon which the gear 30 is mounted shall be rotatable under ordinary circumstances only in one direction so as to close the valve 9. This is accomplished by mounting the gear 30 rotatably on the shaft and forming a ratchet connection thereto, as shown in Fig. 6. The shaft adjacent the gear is formed with notches or grooves 51 therein, and spaces in the gear are recessed to provide a housing for pawls 52 which are pivoted in said recess and free to move therein. There are four of the notches 51 in the shaft, and four co-operating pawls on said gear to fit therein. As shown in Fig. 6, these pawls will slip on said shaft when the shaft is rotated in a clockwise direction, and will engage said shaft when it is rotated in opposite direction. It is therefore obvious that when a gear is rotated in a counter clockwise direction, it will engage the shaft and rotate the same.

Mounted in a chamber 33 below the upper valve chamber are two pivoted valve plates 34 similar in general construction to the valve plates 9, except that they have no opening 12 therein to fit about the drill stem. Their forward faces 35 have a tongue and groove connection to make a tight fit with each other to prevent the passage of fluid upwardly through the housing. Said plates 34 are pivoted upon the pin 14, as are the other valves, and are operated by means of links 18, 18′ engaging in nuts 23, 23′, and operated upon a threaded shaft 36, similar in all respects to the upper valve and its operating means. The outer end of the shaft 36 has a bearing at 37 within the housing, and has on its forward end a gear 30′ identical with that shown and described relative to the upper shaft 29. The ratchet engagement between the shaft 36 and the gear 30′ is the same as was previously described, except that the gear is brought into operative connection with the shaft when the operating crank shaft 32 is rotated in the opposite direction. The idea of this arrangement is that when the crank shaft 32 is rotated in one direction, it will close one set of valves and when rotated in the opposite direction, will close the other set of valves. It will thus be possible with one crank to close either set of valves desired, depending upon whether the drill stem is still in the hole, or whether it has been removed. It is contemplated that the shaft 32, by means of which the valves are operated, may be extended for some distance from the well so that in case of fire the valves may be closed without approaching within danger.

It will be obvious that the purpose of the valve has been performed when the flow of fluid has been stopped and the fire has been extinguished. With the arrangement of operating gears herein described, the valves may be opened only by removing the front plate 39 which houses the gears, and sliding the central shaft 32 and its gear 31 from its position, and then independently rotating the shaft 29 or shaft 36 by a direct connection with the ends thereof, using the gears thereon as handles.

It is sometimes advisable to arrange for the operation of the shafts 24 and 36 in a direction to open the valves while the operator is at some distance from the well, and where this is desirable, the operating means shown in Fig. 7 may be substituted for the means shown in Fig. 4. In this form, the shaft 24 will have on its forward end a beveled gear 40, which has operative connection with another gear 41 mounted upon a vertical shaft 42 within the housing. Shaft 42 has a bearing at 43 within a bracket 44, and extends below the said bracket and has thereon a second gear 45 adapted to mesh with a gear 46 on a shaft 47 at right angles thereto, said shaft 47 projecting beyond the housing and serving as a crankshaft in the same manner as does the shaft 32 previously described. The forward end of the shaft 36 has thereon a gear 48 which may be brought into an engagement with a similar gear 49 on the shaft 47. The said shaft 47 is slidable longitudinally in the housing so as to bring the gears 46 and 49 into or out of operative engagement with the connecting gears 45 and 48, as is desired. It is to be noted that but one of these sets of co-operating gears will be in engagement at one time. Thus, when it is intended to operate the shaft 24 the shaft 47 will be forced inwardly into the position shown in Fig. 7, in which position the shaft 24 may be operated in either direction. When it is desired to rotate the shaft 36, the shaft 47 is moved longitudinally outward bringing the gear 49 into engagement with the gear 48 so that shaft 36 may be operated in either direction.

The operation of my device will be now apparent. When either of the valves is to be closed, the shaft 32 will be operated in such direction as to close the valve desired, and as the shaft is rotated, the block 23 will be forced forward on the threaded shaft to move the valves into closed position. It will be obvious that this closing mechanism will enable the operator to exert sufficient force upon the valves to close them securely, and retain them rigidly in closed position. In this way the flow of fluid through the

housing will be entirely prevented, and if the well has taken fire, the fire may be easily extinguished thereafter. When the well has then been brought under control, the valves may be opened and operations resumed. Openings 50 in the casing head allow the connection of pipes thereto by means of which oil may be drawn off while the valves 9 or 34 are closed.

The advantages of this construction will be apparent to one skilled in the art without further description.

What I claim as new, and desire to protect by Letters Patent is:

1. In a device of the character described, a well casing, a housing thereon, a valve therein comprising two interfitting, cooperating, arcuate plates pivoted on a common axis to swing toward or away from each other to close or open the passage from said casing through said housing, a threaded shaft in said housing, a nut on said shaft, links connecting said nut and said valve plates, and means to rotate said shaft from a distance.

2. In a device of the character described, a well casing in which a drill stem may operate, a housing thereon having a passage therethrough from said casing, means to close said passage when said drill stem is positioned therein, separate means to close said passage when said drill stem is removed, said last mentioned means comprising sector-shaped valve plates pivoted on a common axis and means to close said plates operative from a distance including a block, a shaft having threaded engagement with said block, and links connecting said block and said plates.

3. In a device of the character described, a well casing, a housing thereon having an opening therethrough for a drill stem, and means to close the space in said housing about said drill stem, comprising a pair of sector shaped valve plates shaped to fit about said drill stem, a sliding block, links connecting said block and said valves, and a shaft having an abutment bearing in said casing and having threaded engagement with said block to advance or withdraw it to close or open said valve.

4. In a device of the character described, a casing, a housing thereon, two sets of valves in said housing, one adapted to close said casing about a pipe and the other adapted to close said casing where no pipe is present, a block for each set of valves slidable in said housing, links connecting each block with its valves, threaded shafts connected with said blocks and a rotatable operating shaft connected to said threaded shafts to operate one by rotation in one direction and to operate the other shaft by rotation in the opposite direction.

In testimony whereof I hereunto affix my signature this 28th day of December, A. D. 1923.

EDWARD DORMAN.