

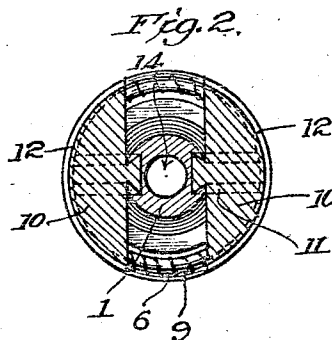
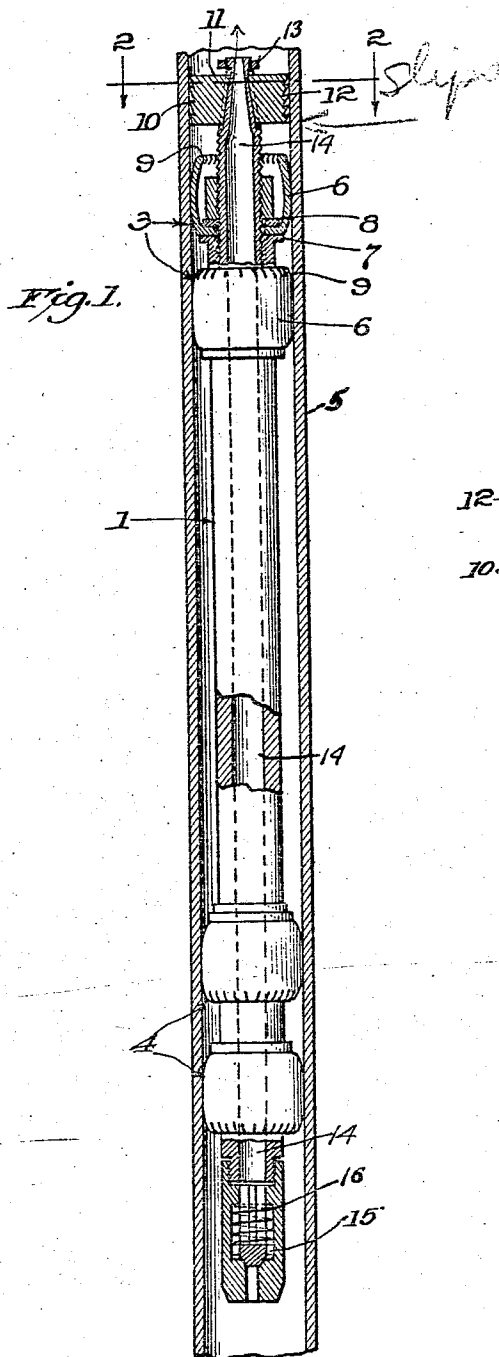
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MEANS FOR LOCATING LEAKS IN WELL TUBING

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MEANS FOR LOCATING LEAKS IN WELL TUBING

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This invention relates to improvements in means for locating leaks in well tubing and the main object of the invention is to provide a leak indicator which will not be liable to ejection or displacement by accumulation of gas or fluid pressure below the same.

The accompanying drawings illustrate my invention, Fig. 1 being a vertical section of the improved leak locating means and the adjacent portion of a well tubing, and Fig. 2 being a section on line 2—2 in Fig. 1.

My improved leak locating means comprises a body member 1 which is adapted to normally operate as a plug in the well tubing, said member 1 having packing means 3 and 4 at the upper and lower portions thereof, adapted to make a gas tight joint with the walls of the well tubing, indicated at 5 in Fig. 1. Said packing means may comprise packing cups or rings 6 of leather or other suitable yielding material, each cup being clamped on member 1 between collar 7 and nut 8, and preferably having its free edge reenforced and drawn in by wire lacing, as indicated at 9. The packing means being flexible and cup shaped with their open ends directed upwardly in the case of the upper packing means and downwardly in the case of the lower packing means, so that pressure of liquid in the well tubing, exerted downwardly in the upper packing means and upwardly in the lower packing means, tends to expand the cups into tight engagement with the well tubing.

In normal operation the member 1, when dropped into a well tubing, descends by gravity, aided by the weight of a column of liquid supplied to the tubing above the instrument, which operates as a plug or closure means in the tubing in such manner that it continues to descend as long as there is a leak below it, permitting escape of fluid, but is arrested when the leak, or the lowest of a number of leaks, is passed by the lower packing means 4, it being understood that the bottom of the tubing has previously been closed or plugged in any suitable manner, so that fluid cannot escape therethrough. The depth of the indicator member 1 is determined by a measuring plumb-line or other-

wise, and the position of the leak thus ascertained, without withdrawing the tubing from the well. It has been found that, using the leak indicator in this manner, conditions sometimes arise in which accumulation of gas pressure in the well forces the instrument upwardly and causes sudden ejection of the same from the tubing or upward displacement of the indicator from position opposite the opening. To avoid such undesirable result I provide the member 1, for example at its upper end, with slips 10 sliding in inclined guideways 11 in member 1 and provided on their outer faces with gripping teeth or serrations 12, adapted to engage the wall of the well tubing in such manner as to permit the member 1 to slide freely down the well tubing but to prevent any upward movement of member 1 in the well tubing. The indicator member 1 will, therefore, remain in position once it has reached the lowermost leak. A nut 13 on member 1 retains the slips on said member.

In case of accumulation of high gas pressure beneath the instrument above described, it is desirable to provide for relieving such pressure as the tubing is withdrawn, so as to prevent possibility of a dangerous efflux of gas at high pressure when the tube section containing the instrument is withdrawn and uncoupled. For this purpose I may provide the member 1 with a longitudinal bore or passage 14, extending through the said member from top to bottom, and provided with a valve 15 which is normally held closed by a spring 16, exerting a pressure of say 25 or 30 pounds. When the instrument is lowered into the tubing by hydrostatic pressure of a column of liquid above the same, such hydrostatic pressure may be made to substantially balance the gas pressure below the instrument, but as the tubing is withdrawn and uncoupled, section by section, the pressure above the instrument decreases, and eventually the valve will open against the action of its spring, allowing some of the gas to escape, and thus relief of the gas pressure is repeated as the drawing of the tubing proceeds, until, when the section containing the instrument is

reached, the excess of gas pressure below the instrument is wholly relieved, and that section can be uncoupled without danger of violent escape or blow off of gas.

5 In regard to operation of relief valve, it may be stated that during the time of the descent of the indicator and until same has reached the lowermost leak this valve does not open and interfere with the successful
10 operation of the indicator for the following reasons: First, the spring that holds the ball on its seat has a greater tension than the weight of the instrument. Second, that the pressure above is always increasing due to the rapidity with which it is entering the
15 pipe. Therefore, the resulting pressure below the indicator cannot at any time more than equal the pressure above until said indicator has reached the lowermost leak and the operation of removing the pipe has been
20 commenced.

While I have shown the passage 14 as extending to the top and bottom of member 1 it will be understood that it is sufficient for the purpose of this invention, that the passage shall communicate with the space around
25 member 1 and within the well tube, at any point above the upper packing means and at any point below the lower packing means.

30 There is a cooperative relation between the slip devices for preventing upward movement of the instrument and the relief valve arranged in the longitudinal passage. Without the slip devices the relief valve would not
35 serve its intended purpose when bucking occurs in the well tubing. The slip devices prevent upward movement of the instrument so that the relief valve can perform its function of permitting fluid to pass therethrough and
40 prevent any surging or bucking condition in the well tubing from displacing the instrument when in indicating position at a leak in the tubing. This combination serves a
45 new and useful result; i.e., enabling the instrument to give a true indication of the position of the leak.

I claim:

1. An instrument adapted to fall by gravity in a well tube for locating leaks in the well tube, comprising a body member provided with upper cup shaped packing means adapted to expand under pressure from above and lower cup shaped packing means adapted to expand under pressure from below, so as to
50 act as closure means for the well tube, and slip devices movably mounted on said member adapted to engage the walls of the tubing to automatically move said slip device to position to grip the tubing and prevent upward
55 movement of the instrument in the tubing, said body member having a longitudinally passage and an upwardly movable valve therein.

2. An instrument as set forth in claim 1 in which said body member is provided with

inclined guideways on which said slip devices slide.

3. An instrument adapted to fall by gravity in a well tubing for locating leaks in the well tubing, comprising a body member provided with upper cup-shaped packing means adapted to expand under pressure from above and lower cup-shaped packing means adapted to expand under pressure from below to act as closure means for the well tubing, said body member having a longitudinal passage, and with an upwardly opening valve in said passage provided with means for normally holding it in closed position, and means mounted on said body member to grip the walls of the tubing to prevent upward movement of the device.

In testimony whereof I have hereunto subscribed my name this 18th day of September, 1928.

PAUL H. GRANGER

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