O. A. LAYNE.

IMPACT DEVICE.

APPLICATION FILED JUNE 25, 1918.

1,328,569.

Patented Jan. 20, 1920.

Fig. 1.

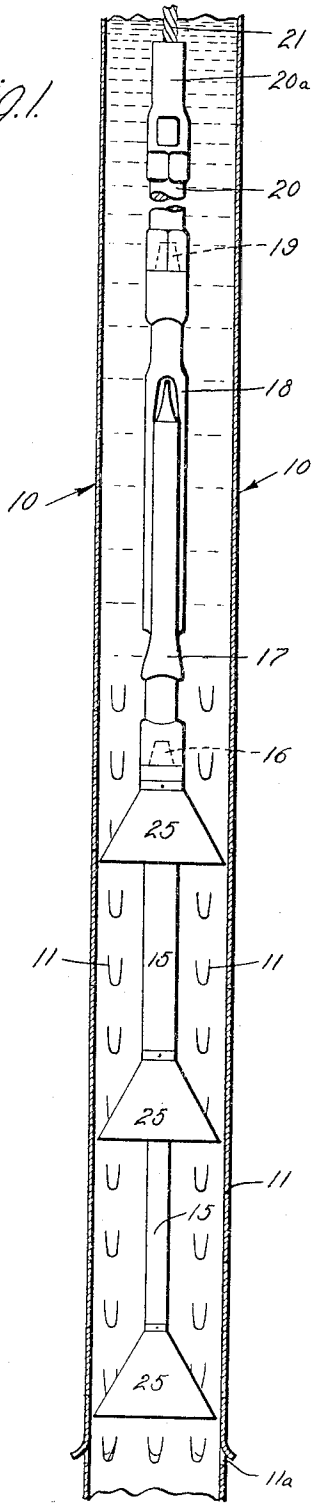
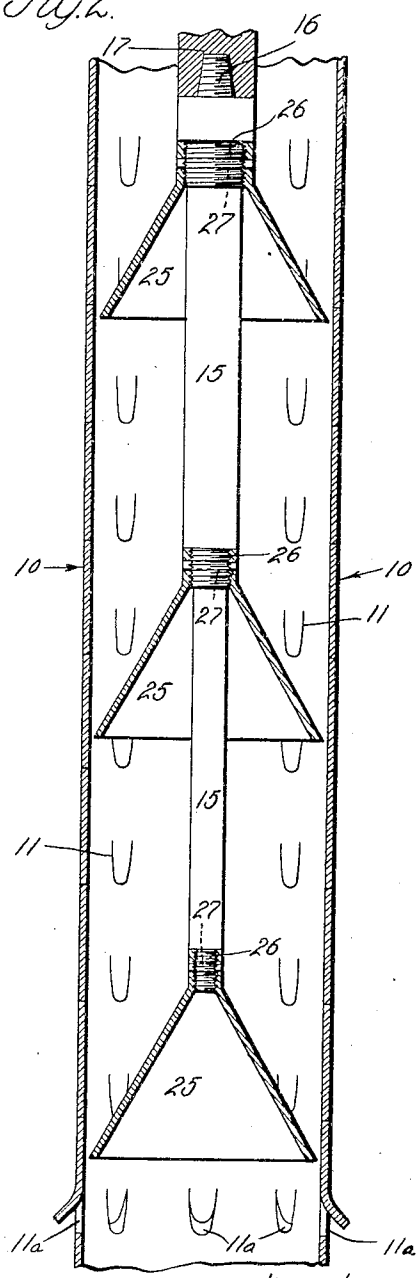


Fig. 2.



Inventor
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by Fred T. Barker
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UNITED STATES PATENT OFFICE.

OLLYN A. LAYNE, OF LOS ANGELES, CALIFORNIA.

IMPACT DEVICE.

1,328,569. Specification of Letters Patent. **Patented Jan. 20, 1920.**

Application filed June 25, 1918. Serial No. 241,750.

To all whom it may concern:

Be it known that I, OLLYN A. LAYNE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Impact Devices, of which the following is a specification.

This invention relates to devices adapted to deliver impact; and relates particularly to devices adapted to deliver impact to a fluid; and it is an object of this invention to provide an efficient device for delivering an impact or shock to fluid in a well casing; the present purpose and object of so delivering an impact to fluid in a well casing being to open up previously formed or cut openings in the well casing so as to perforate the casing, or to free clogged openings in such a casing. The device may also be used for driving out accumulations of material in a pipe, or for any other like purpose to which the device may be adapted. I shall explain the use of the device particularly for opening perforations in a casing or the like. The explanation of its operation for that use will typify its use for other operations.

For the purposes of the following detailed description I refer to the accompanying drawings in which I have illustrated a preferred form of my device and have illustrated its use for opening perforations in casings; and in which drawings Figure 1 is a vertical longitudinal section of a casing showing my device as it appears in use therein; and Fig. 2 is an enlarged section of the lower portion of my device in place in a casing.

In the drawings I show at 10 a casing which in this particular case has been cut at 11 to form weakened displaceable parts which may be displaced outwardly by internal pressure, to form perforations or openings as shown at 11^a. Such a casing, previously weakened or cut, is put into the well in its smooth unperforated form, and then the severed or weakened parts are forced outwardly to open the perforations. This construction typifies any similar construction in which perforations may be opened by internal pressure; and my device may be used in any such situation, or it may be used for the purpose of forcing any clogging accumulation out of perforations which have previously been formed.

My device may be constructed in the manner now to be described. I may preferably use a vertical stem 15 adapted at its upper end at 16 to be connected to the lower member 17 of a pair of jars of the ordinary and well known type; the upper member 18 of the jars being attached at 19 to a string of drilling tools which may comprise a stem 20 of any desired length and weight, or merely a rope socket 20^a if no great weight is required, or directly to a rope socket 20^a to which the cable 21 is affixed. If it is found necessary or desirable a heavy tool stem may be interposed between the upper jar member 18 and the rope socket 20 to add weight to the upper jar member so that the upper jar member may move downwardly and strike the lower jar member a heavy blow.

Upon the vertical stem 15 I mount a plurality of impact delivering members which substantially fill the cross-section of the casing and are preferably hollow cones 25, opening downwardly and preferably spaced somewhat from each other as is shown in the drawings. These hollow cones may be steel castings of sufficient weight and strength and may be screw-threaded onto the stem 15 as indicated at 26, the stem being shouldered at each cone for this purpose; and pins 27 may be used to prevent the cones from unscrewing. These cones are of a diameter just slightly less than the internal diameter of the casing in which they work. For instance, in a ten or twelve inch casing the cones might be about one half inch less in diameter than the internal diameter of the casing. The cones are of such diameter and so spaced apart that they form a guide which keeps the jars etc. above in vertical position and prevents or restricts them from striking the casing wall. The angle of the cones is such that sand and other solid matter will slide off them and pass over their edges on down through the casing; and furthermore this angle is such as to give great strength to the cones to resist upward displacement or rupture when the upper jar member strikes the lower jar member and tends to force the cones downwardly. Such an angle as shown in the drawings has been found to be a good angle for the cones.

In the use of the device the casing is filled with water or other fluid, if it is not already so filled with some fluid; and the device is lowered to the lowermost point at which it

is desired to open the perforations. The cable 21 is then suddenly released, allowing the upper jar member and the tools above to fall and strike the lower jar member and the stem 15 a sudden concussive blow. The upper parts of the tool will fall faster than the cones 25 because the cones, owing to resistance of the liquid, and particularly owing to their downwardly flaring shape, are impeded in their passage through the liquid. Comparatively speaking, the cones remain stationary in the fluid while the upper parts fall and strike them. Consequently, the upper parts of the device will strike the lower parts of the device a sharp heavy blow; and the resulting impact will be transmitted to the liquid under each of the cones 25. The impact transmitted to the liquid is then transmitted by the liquid and forces out the incised portion at the cuts 11, or forces out any accumulation of material in any perforations in the length of casing acted upon by the liquid transmitted impact. Then the whole tool is raised a short distance above its initial position and the impact operation repeated. The tool is raised as many times as is necessary to perform the perforation opening operation upon as much of the length of casing as desired.

It is a feature of my device that no mechanical means are necessary to hold it in position in the casing, the liquid resistance performing this function. There are no spring devices and no trigger mechanisms. No special guides are necessary; the spacing of the cones performing the guiding function.

From the foregoing description my invention will be understood as not being particularly limited to the specific use herein set forth; although it is especially useful in perforating a casing which has been previously locally weakened or cut, in accordance with my process which I have set forth in application Serial No. 131,022, filed November 13, 1916, method of forming separators for wells.

Having described a preferred form of my invention, I claim:

1. A device of the character described, comprising in combination a vertical stem, a plurality of downwardly flaring hollow cones spaced apart vertically on the stem and adapted to substantially fit inside a well casing, and means to strike a downward blow on the cones to deliver an impact to fluid below the cones in the casing.

2. A device of the character described, comprising in combination a vertical stem, a plurality of downwardly flaring hollow cones spaced apart vertically on the stem, and means to strike the stem a downward blow, comprising a pair of jars the lower member of which is secured to the upper end of the stem and the upper member of which strikes the lower member when the upper member is suddenly lowered with the cones submerged in a fluid.

3. An impact device, embodying in combination a vertical stem, a plurality of longitudinally spaced circular members on the stem extending outwardly around it and adapted substantially to fit the inside of a well casing, and means to strike a downward blow to the stem to deliver an impact through said members to fluid below said members in the casing.

In witness that I claim the foregoing I have hereunto subscribed my name this 17th day of June 1918.

OLLYN A. LAYNE.