

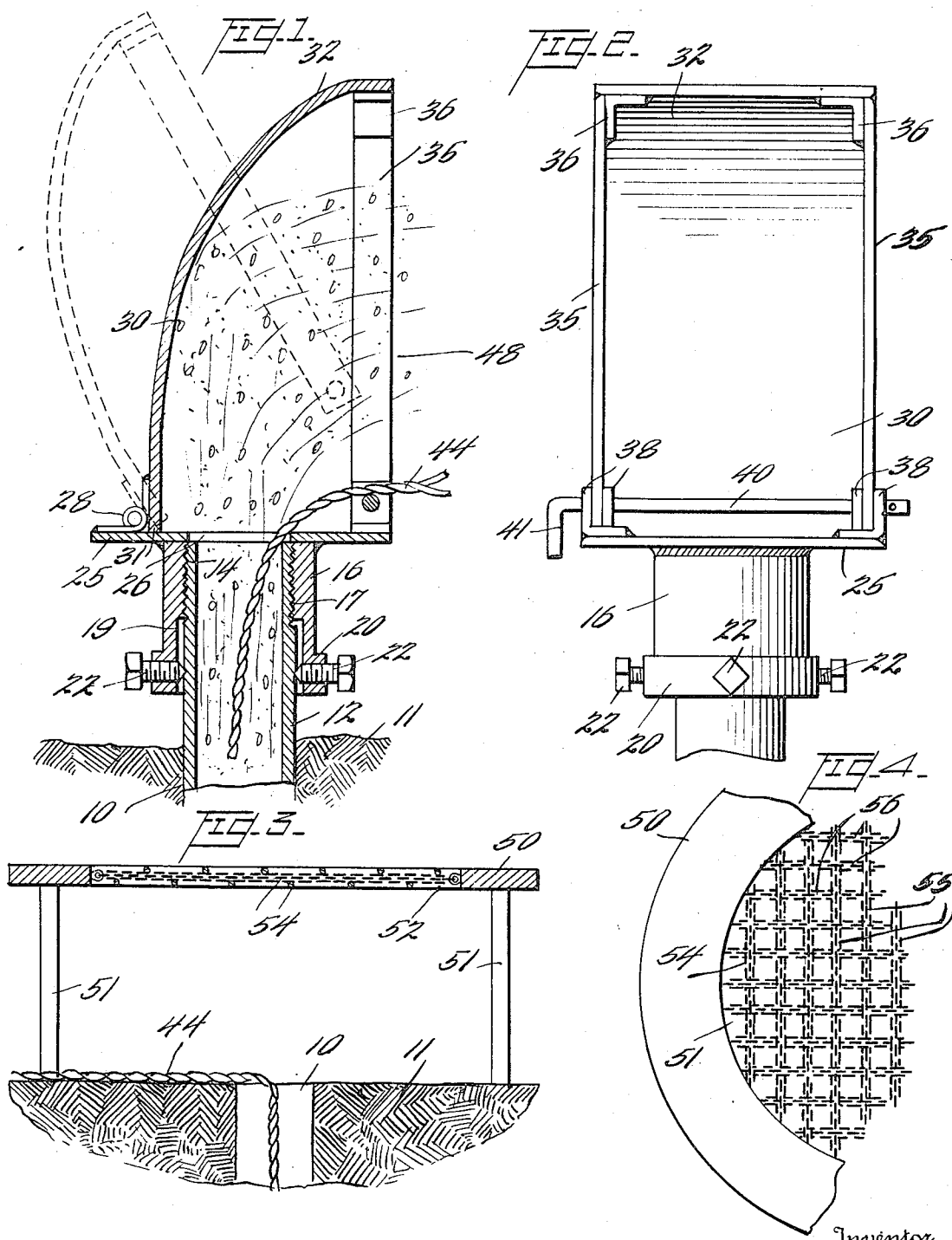
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SPRAY DEFLECTOR FOR SHOT HOLES

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SPRAY DEFLECTOR FOR SHOT HOLES

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This invention relates to deflectors for shot holes, and more particularly to deflectors for use over drilled shot holes such as used in seismic surveying where the explosive is tamped by filling the hole with water.

In the pursuance of seismic surveys for geophysical prospecting it is the practice to produce artificial earth seisms by the explosion of charges of high explosive such as dynamite or the like. In order that the results be satisfactory, and to reduce the quantity of explosive necessary to achieve satisfactory records, it is the standard practice to explode the material sufficiently far beneath the surface of the earth so that it is embedded in the more solid geological structures beneath the so-called weathered layer of the earth which may be from 1 to 500 feet thick in accordance with the geographical location of the work.

In order to get the explosive material to this depth it is introduced into a drilled hole formed in any of the well-known manners as by the use of a core drill or other forms of earth or rock drills. The force of the explosion, for the purpose of seismic recording, is best augmented and directed downwardly by adequate tamping of the charge in the hole. This tamping is most simply effected by filling the hole with water. Where the hole is to be used for several shots it is customary to case the same by introducing a section or more of suitable piping, thereby protecting the walls from collapse and permitting additional shots to be more readily loaded.

The dynamite or other explosive material is always fired electrically and for this purpose a pair of conductors attached to the detonator cap, which is embedded in the charge, must extend from the bottom of the hole out to the surface and then to the firing device. When the explosion is created, and particularly when charges of considerable size are used, the tamping water along with certain quantities of mud, rock particles, and the like is violently ejected from the mouth of the hole or casing and sometimes is thrown into the air for a vertical distance of 200 or 300 feet. Obviously with a high wind, spray from this effluent may be carried for a distance of a quarter of a mile or more. The metal parts of the detonating cap and the conductors leading to the same are ejected with this spray. Damage is often caused to houses, orchards, fields of grain, and other property by this spray and if the shot takes place in the vicinity of telephone or power lines there is serious danger of disrupting them or of entangling

the shot firing wires with the overhead conductors and the possibility of short-circuiting them and causing great damage. There is likewise danger of persons being injured due to shocks.

It is therefore the purpose of the present invention to provide deflection means serving to break up the spray and divert it from its normal vertical course or to reduce its intensity sufficiently, and to restrain the wires and cap fragments, to eliminate the possibilities of the damages mentioned above.

The invention may take several forms variously adapted for use with or without casings but in every case the purpose is to reduce the distance to which the liquid and wires are projected and to deflect them away from objects which might be damaged thereby.

One of the important objects of the invention is to provide simple equipment for spray deflection which can be readily transported and used over and over again in connection with the firing of a plurality of shot holes.

For a complete understanding of the invention, reference should be had to the accompanying drawing and following specification wherein are disclosed several embodiments of the invention with the understanding that such changes and modifications may be made therein as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawing:

Figure 1 is a vertical central section through a form of deflector intended primarily for use with cased shot holes;

Figure 2 is a front elevation of the same;

Figure 3 is a central vertical section through a second form of the invention intended for use with uncased shot holes; and

Figure 4 is a fragmentary plan view of the device of Figure 3.

Referring now particularly to Figure 1 there is shown a bore hole 10 in the earth 11 which is fitted with a casing or tubular pipe member 12 shown as threaded at its upper end as at 13, although as will be later described the invention is equally as applicable to an unthreaded casing end.

The deflector assembly includes a tubular fitting 16 having a through central bore threaded at its upper end as at 17 for engagement with the threads on the casing, the bore being counter-bored as at 19 at the lower end to be optionally accommodated over an unthreaded casing end. The reinforcing collar 20 at the lower end of the fitting is tapped at three or more points to receive

cap or set screws 22 which may be tightened until their sharp pointed ends are slightly embedded in the surface of the casing to lock the fitting in position thereon, whether the same is threaded or not.

As shown, this fitting has welded or otherwise secured to its flat upper face a plate 25 having a bore 26 forming a continuation of that in the fitting. A hinge, or hinges, 28 is welded or otherwise secured to this plate near one edge thereof and its other wing is similarly secured to a deflector plate 30, the hinge being so positioned on the base plate 25 that the lower edge 31 of the deflector plate is offset from the hole 26. The deflector plate may well be curved as shown so that when the portion to which the hinge is attached is substantially vertical, the upper portion 32 at least overhangs the projected area of the casing bore and is preferably inclined to the casing axis by an angle less than 90°, whereby this plate acts to deflect laterally any material ejected from the casing as shown in the drawings.

The hinge is provided so that the deflector plate may be thrown back out of the way to permit the introduction of a further charge which is usually pushed down into the hole with the aid of a suitable loading pole. After the charge is inserted, the plate is brought to the position shown in Figure 1 and secured there by the use of the straps 35 attached by means of the reinforcing corner angles 36 to each of the upper corners of the deflector plate. These straps extend downwardly substantially vertically and their perforated lower ends fit between correspondingly perforated lugs 38 appropriately welded to the edge of the base plate 25 opposite to that to which the hinge is attached. A rod 40 passes through all of the aligned perforations and serves to rigidly hold the deflector plate in the position shown in the figure from which it can be thrown to the dotted line position upon the withdrawal of the rod, the end of which is conveniently bent over as at 41 to permit the same to be readily grasped.

In operation it will be understood that the conductors 44 leading to the cap are passed over the rod 40 and down into the hole as shown. The deflector is adjusted by rotation on the casing to aim the discharge away from any objects which might be damaged. The ejected material striking the curved undersurface of the deflector plate is turned to move laterally to a degree adjustable by the initial curvature of the plate. The force of the ejected fluid is largely absorbed in this contact with the plate and the stream is broken into drops so that the lateral ejection is of short extent. The wires and cap parts are prevented from being thrown vertically into the air so that damage to any overhead structure is prevented. Under certain conditions the mouth 48 of the ejector may be faced up-wind to counteract the tendency of the spray to be carried great distances down-wind.

The device of Figures 1 and 2 cannot be secured in position over a hole which is not cased, since it relies for stability upon rigid attachment to the casing head. In the absence of a casing a device such as that shown in Figures 3 and 4 is preferred. This comprises a heavy metal frame such as the annulus 50 adapted to be mounted horizontally above and spaced from the mouth of the hole by means of a plurality of vertical legs 51. The central opening 52 in the annulus is closely filled by chain mesh fabric 54 which may

be effected by interlacing or weaving chains 55 and 56 as shown in Figure 4. The space between any two adjacent links of the chains is preferably such that parts of the cap and the wires cannot be blown between them.

The rapidly moving effluent liquid column resulting from the explosion is so broken up upon engagement with the curved lower surfaces of the links that it is deflected in all lateral directions and broken into a fine spray. At the same time its velocity is so seriously reduced that the spray will only travel from ten to fifteen feet into the air and will not damage closely adjacent property. The wire and cap parts are caught and prevented from being thrown upwardly any higher than the deflecting plate. The device is naturally of sufficient weight to prevent the whole apparatus from being lifted by the force of the explosion. If desired the legs may be pointed and partially driven into the ground to provide additional stability.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A deflector for deflecting debris ejected from a shot hole in the firing of an explosive charge in conducting seismic surveys including, in combination, a shot hole casing, a fitting releasably connected to said casing, a deflector plate hinged at its bottom to said fitting and shaped and positioned to extend in deflecting relation to the bore of said casing, and means to removably secure the plate in said position whereby it may be swung clear of said bore for charging and tamping the bore of said casing.

2. A deflector for deflecting debris ejected from a shot hole in the firing of an explosive charge in conducting seismic surveys and adapted for use with a shot hole, in combination, a shot hole casing, a hollow fitting releasably secured to the upper end of the casing and having a base plate in a plane at right angles to the casing axis and perforated in alignment therewith and with the fitting, a deflector plate hinged to said base plate beyond said perforation and adapted to be swung to clear the bore axis, and means to connect the free edge of said deflector plate to the edge of the base plate opposite the hinge so as to position the same in deflecting relation to the casing bore.

3. A deflector for deflecting debris ejected from a shot hole in the firing of an explosive charge in conducting seismic surveys and adapted for use with a shot hole housing a casing, in combination, a hollow fitting releasably secured to the upper end of the casing and having a base plate in a plane at right angles to the casing axis and perforated in alignment therewith and with the fitting, and a deflector plate secured to said base plate beyond the edge of said perforation and being positioned to extend on an incline over the projection of the bore of the casing to deflect all material issuing therefrom.

4. A deflector for deflecting debris ejected from a shot hole in the firing of an explosive charge in conducting seismic surveys and adapted for use with a shot hole, in combination, a shot hole casing, a hollow fitting having a portion engaging over the upper end of the casing, means to secure the fitting to the casing, a deflector plate having its lower edge attached to said fitting for hinging action relative thereto, and removable means to position the upper edge of the plate in respect to the fitting so that the plate is inclined

to the axis of the casing and covers the projected area of the casing bore at an angle to the axis less than 90°.

5. A deflector for deflecting debris ejected from a shot hole in the firing of an explosive charge in conducting seismic surveys and adapted for use with a shot hole having a casing, compris-

ing, in combination, a shot hole casing, a deflector plate and means to mount the same on the casing and in a position to deflect laterally all material issuing from the casing.

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CERTIFICATE OF CORRECTION.

Patent No. 2,387,770.

October 30, 1945.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 55, claim 3, for the word "housing" read --having--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of February, A. D. 1946.

Leslie Frazer

(Seal)

First Assistant Commissioner of Patents.