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DEVICE FOR CLEANING THE WALLS OF BOREHOLES

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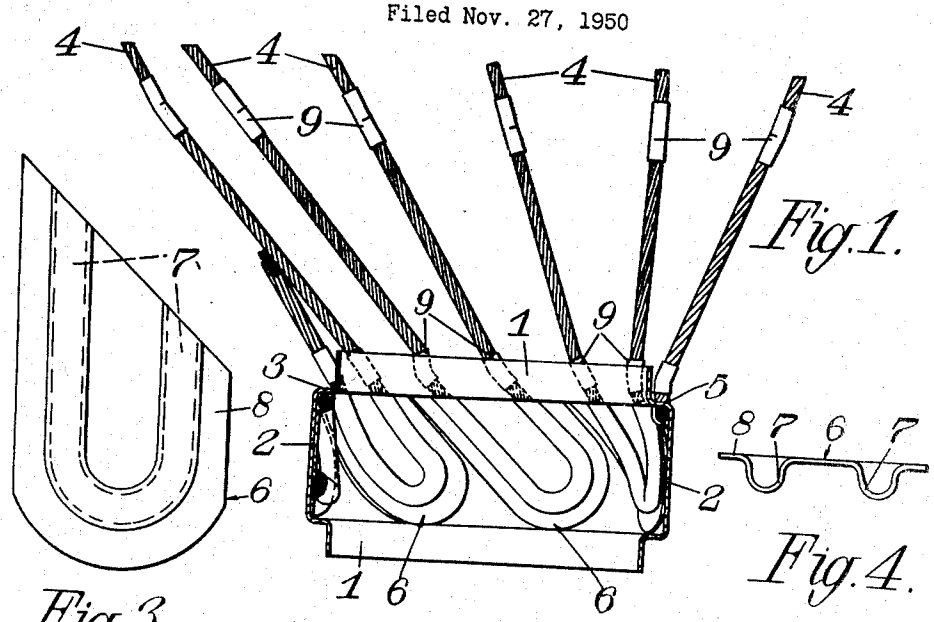


Fig. 1.

Fig. 3.

Fig. 4.

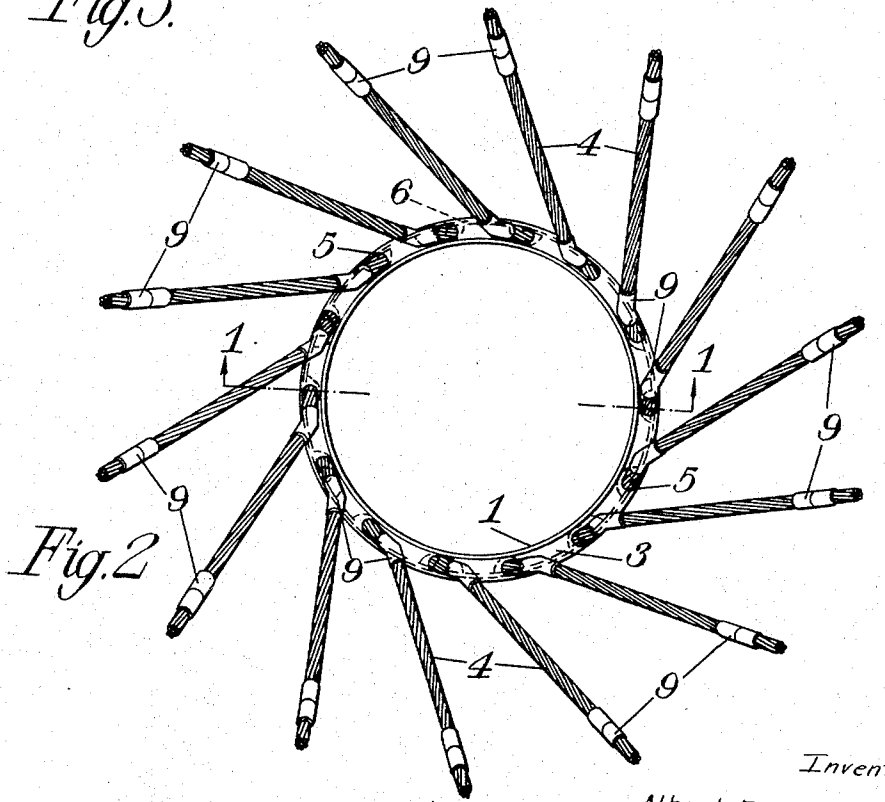


Fig. 2.

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DEVICE FOR CLEANING THE WALLS OF BOREHOLES

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6 Claims. (Cl. 166—173)

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This invention relates to devices for cleaning the walls of bore holes, of the kind comprising a plurality of stiff wires or wire bristles carried by a ring which is adapted to be mounted on the outside of the bore hole casing, the wires extending outwardly from the ring and arranged so that by reciprocating the casing in the hole the wires exert a scratching action for cleaning the wall by the removal of caked mud or the like therefrom. Such devices are primarily intended for removing caked mud from the bore hole immediately before the casing is cemented in the hole. The wires of such devices are liable to be subjected to very considerable strains during use, as for example due to irregularities or changes in direction of the bore hole, and as a result the wires are sometimes torn from the ring to which they are attached. It is the object of the present invention to provide a stronger and more effective attachment for the wires whereby the above disadvantage is largely or wholly overcome in a simple and convenient manner.

The invention consists in a device of the kind described comprising a mounting ring having a continuous sleeve or sheath to the interior surface of which the wires are attached so that the attachment is completely shrouded and protected, the attachment being preferably effected by the aid of metal cleats or cover elements welded to the said sleeve or sheath.

The invention further consists in a device according to the preceding paragraph in which the wires are doubled or folded in two and the folded ends are secured to the inside of the aforesaid sleeve or sheath which constitutes part of the mounting ring. Preferably the folded ends are of narrow U-shape and are secured by the aid of metal cleats or cover elements having a correspondingly U-shaped recess.

In a preferred arrangement according to the invention, the ring carrying the wires is formed or provided with a peripheral portion or portions adapted to fit and engage the bore hole casing, and with an adjacent peripheral portion of larger diameter to the interior surface of which the wires are secured. The portion of larger diameter may conveniently be connected to a smaller portion by a shoulder in which apertures are provided through which the wires project. Preferably the ring is formed in a single piece by a swaging, spinning or like operation and comprises a middle sleeve or sheath of larger diameter integrally joined by shoulders to concentric portions of smaller diameter at each end thereof.

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The wires employed may be of any suitable character, but preferably bundled or stranded wire is used and the projecting wire portions are provided with one or more small metal sleeves or thimbles secured thereto and suitably angled to impart a desired directional set to the wires. It is to be understood that the wires are uniformly spaced about the axis of the mounting ring and preferably they are inclined to the said axis, including the end portion of the wire which is secured to the interior of the sleeve or sheath previously described. Those portions of the wires which project from the aforesaid apertured shoulder are formed to extend outwardly in a generally tangential direction and this setting of the wires is maintained by the small sleeves or thimbles referred to above.

In the accompanying drawing,

Figure 1 is a sectional elevation of a device constructed in accordance with the invention for cleaning the walls of bore holes, the section being taken on the line X—X of Figure 2;

Figure 2 is a plan view of the device;

Figure 3 is a side elevation of one of the metal cleats employed for securing the wires;

Figure 4 is an end view of one of the cleats.

In carrying the invention into effect according to one convenient mode, a metal ring is provided in the form of a cylindrical sleeve comprising end sleeve portions 1, 1 integrally joined to an intermediate sleeve portion 2 of larger diameter by shoulders 3. All three sleeve portions are concentric. The end sleeve portions 1 are dimensioned to fit over the bore hole casing, and the diameter of the intermediate sleeve 2 is such that the ends of the scratching wires can be conveniently accommodated within it. The ring or sleeve as described above may be formed by a swaging, spinning or like operation.

The wires 4 which constitute the scratching or wall cleaning elements may be of any suitable character as previously employed in such devices, but preferably they are bundled or stranded wires of suitable size and stiffness. Each wire is doubled or folded in two in the form of a narrow U-shape. The sides at the folded end are preferably parallel but the remaining portions may be slightly splayed if desired as shown in Figure 1. The folded ends or bights are secured to the inside surface of the intermediate sleeve portion 2 of the ring or sleeve and suitable holes 5 are provided in the adjacent shoulder 3 through which the ends or standing parts of the wires project. The said folded ends are attached so that they lie substantially parallel to the casing wall and

extend obliquely with respect to the ring axis, the angle being widely variable, but may be in the neighbourhood of 45°. The attachment of the folded ends is effected by the aid of metal cleats or cover elements 6 each of which is formed with a U-shaped recess 7 which encloses the U-shaped wire fold, the edges 8 of the cleat or cover being welded to the interior surface of the intermediate sleeve 2, preferably by spot welding. The wires may be further secured by soldering them inside the cleats before attachment of the latter, or by indenting the cleat after attachment, or by both means. The cleats abut the shoulders 3 and this arrangement aids in securing the cleats in position.

The ends of the wires which extend outside the sleeve shoulder are formed to extend outwardly and also in a generally tangential direction with respect to the ring axis as shown in Figure 2. One or more small sleeves or thimbles 9 are secured over the free portion of the stranded wires to ensure the required setting thereof. Thus two sleeves 9 may be provided for each projecting wire, one near the sleeve shoulder and one near the free extremity of the wire, and these sleeves may be suitably angled as shown to afford the desired setting of the wire. The wires employed are preferably multiple spring steel wires which may be either bound together by the thimbles aforesaid or stranded, to give the desired stiffness consistent with the capability of returning to their original positions after use so that tangling is obviated.

The invention provides a more secure, robust and protected attachment for the wires than hitherto, and the risk of wires being torn from their anchorages during use of the device is thereby greatly reduced. The invention is not restricted however, to the example described, since the particular arrangement and disposition of the wires in the encircling sleeve or sheath may be varied to suit particular circumstances, and different types of wire may be employed.

I claim:

1. A device for removing caked mud and the like from the walls of bore holes, comprising a ring adapted to be mounted on the outside of a bore hole casing, said ring comprising a portion having an inside diameter fitting the casing, a shoulder portion extending outwardly therefrom, and a skirt portion connected to said shoulder portion and of a size for enclosing an annular chamber about the bore hole casing, mud cake scratching wires having upstanding U-shaped bight portions disposed in said chamber and generally parallel to the bore hole casing wall and with the end portion of the wires extending through said shoulder portion and outwardly therebeyond, and means within said chamber for securing said U-shaped portions to said ring.

2. A device according to claim 1, said securing means comprising cover plate means positioned within the space afforded by said skirt portion,

welded thereto, and internally abutting said shoulder portion, said cover plates having U-shaped grooves therein embracing said U-shaped bight portions.

3. A device according to claim 2, said cover plates having portions thereof substantially bridging the space between said skirt portion and the wall of the bore hole casing.

4. A device for removing caked mud and the like from the walls of bore holes, comprising a ring adapted to be mounted on the outside of a bore hole casing, said ring comprising a portion having an inside diameter fitting the casing, a shoulder portion extending outwardly therefrom, and a skirt portion connected to said shoulder portion and of a size for enclosing an annular chamber about the bore hole casing, a plurality of separate mud cake scratching wires each having a U-shaped bight in its central portion and an upstanding portion at each end of said bight, said bights being disposed in said annular chamber generally parallel to the bore hole casing wall and said upstanding portions extending through said shoulder portions in spaced relation to each other and being turned outwardly therebeyond, and means within said annular chamber for securing said bight portions to said ring.

5. A device according to claim 4, said securing means comprising cover plate means positioned within the space accorded by said skirt portion and welded thereto, said cover plate means having U-shaped grooves therein embracing said U-shaped bight portions, the spacing of said skirt portion from the bore hole casing being substantially just sufficient to accommodate the bights and cover plate means therebetween.

6. A device for removing caked mud and the like from the walls of bore holes, comprising a ring adapted to be mounted on the outside of a bore hole casing, said ring comprising a connecting portion fitting the casing and a skirt portion spaced from the casing, mud cake scratching wires having upstanding U-shaped bight portions lying within and parallel to the walls of said skirt portion, said wires extending longitudinally from the skirt portion parallel to the bore hole casing wall and then bent, in the clear, to flare laterally outwardly to project beyond the skirt portion, and means for securing the U-shaped bight portions within said skirt portion.

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