United States Patent [19]

Turbyfill

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[54] **WELL BORE WALL CLEANER**

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[52] **U.S. Cl.** **166/173**, 166/241

[51] **Int. Cl.** **E21b 37/02**

[58] **Field of Search** 166/173, 241

[56] **References Cited**

UNITED STATES PATENTS

2,881,840	4/1959	Wright et al.	166/173
3,087,550	4/1963	Tyrrell	166/241 X
3,120,271	2/1964	Hall	166/173 X
3,162,246	12/1964	Wright	166/173
3,268,008	8/1966	Turbyfill	166/173
3,357,494	12/1967	Bolding	166/173

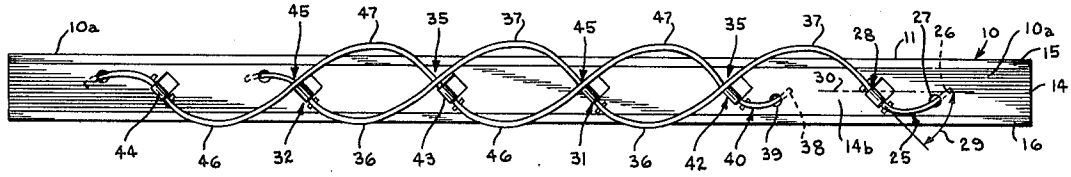
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[57] **ABSTRACT**

A body is provided with means for securing it to a tubular member, and the body is provided with a plurality of first helical, flexible cable loops with a portion of each loop facing in one direction and the other loop portion facing in an opposite direction relative to the longitudinal axis of the body to provide leading and trailing portions in each cable loop, and a plurality of second helical, flexible cable loops are mounted on the body with a portion of each loop facing in one direction and the other loop portion facing in an opposite direction, and with the second cable loops being longitudinally offset in relation to the first helical cable loops to form a figure 8 in plan view and thereby provide a plurality of adjacent leading and trailing portions with the leading portions facing in the direction of movement of the tubular member in the well bore to thereby engage the well bore wall and resist collapsing as the tubular member is moved to clean the well bore wall.

6 Claims, 6 Drawing Figures



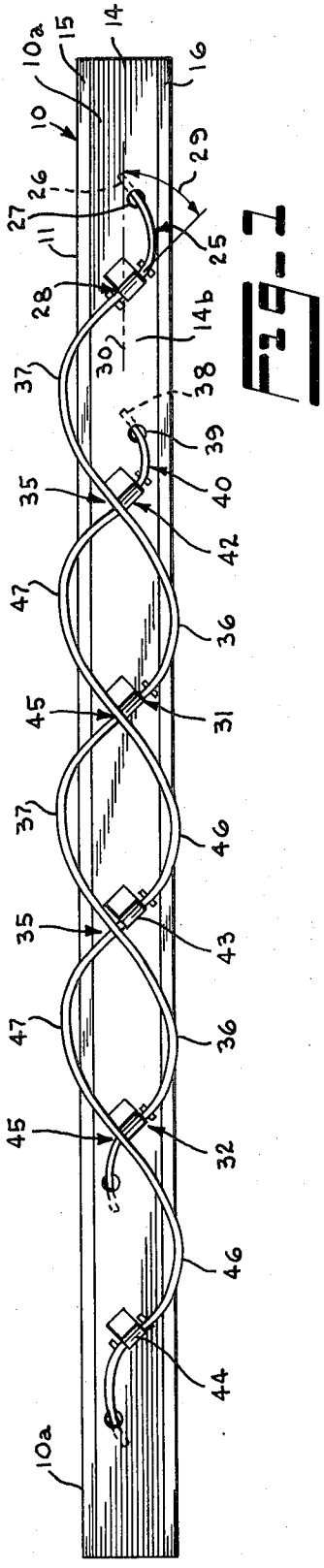


Fig. 1

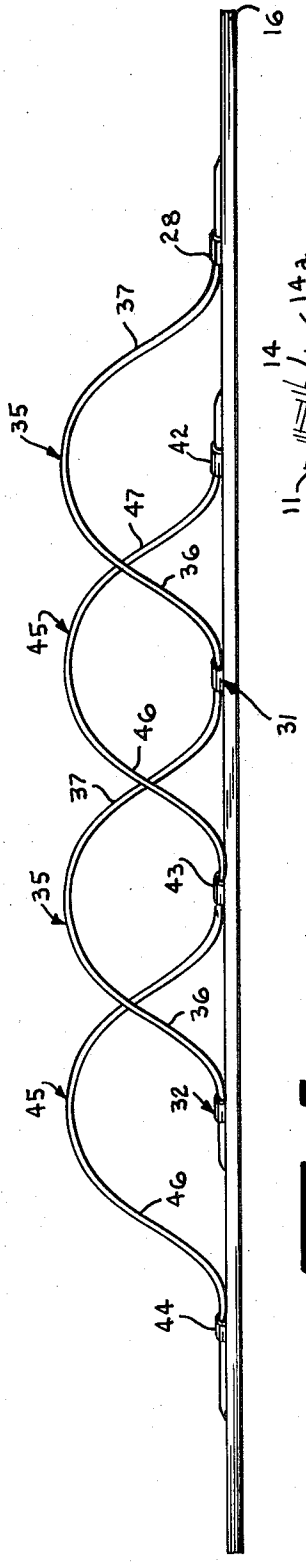


Fig. 2

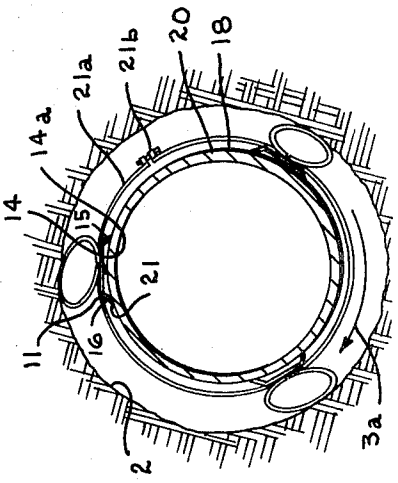


Fig. 3

Fig-5

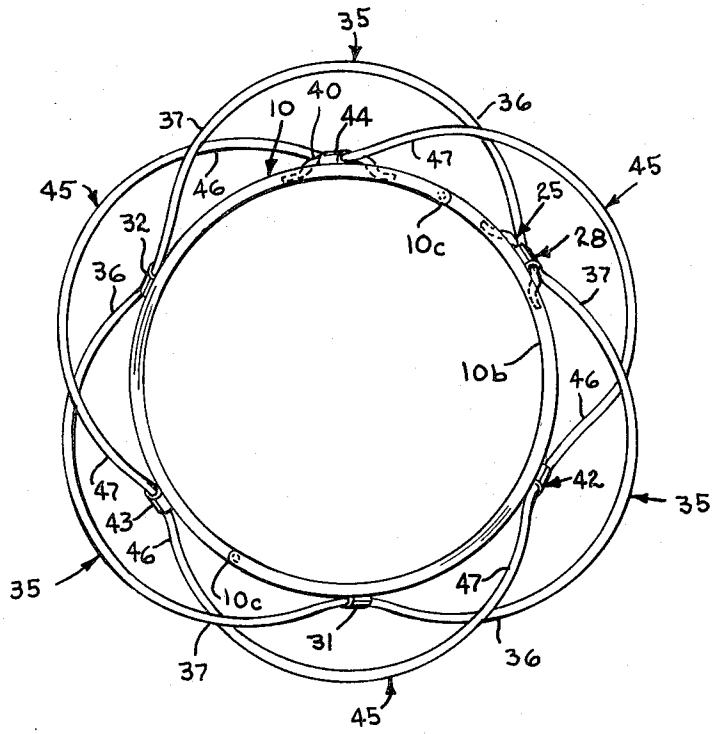
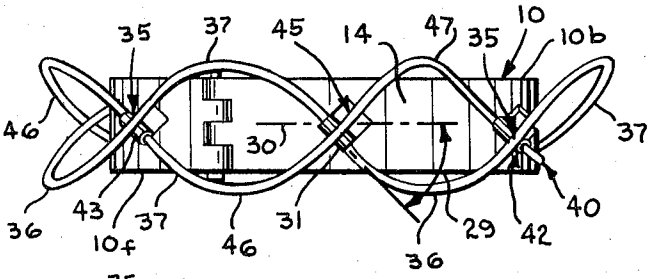


Fig-4



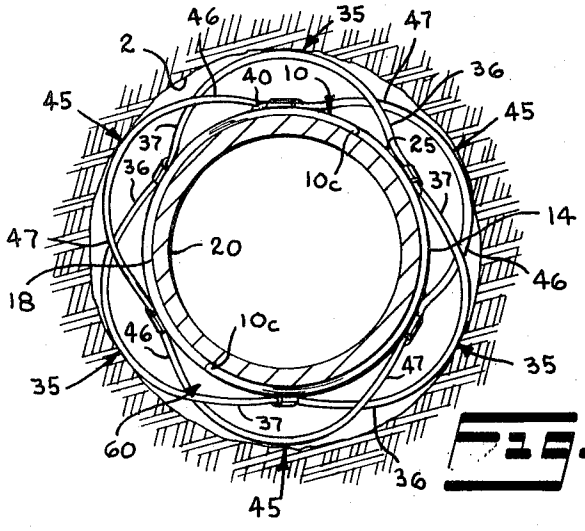


Fig-6

WELL BORE WALL CLEANER

SUMMARY OF THE INVENTION

The prior art with which applicant is most familiar includes U.S. Letters Pat. No. 2,826,253 and French Pat. No. 540,910 issued to Barcal.

The Wright patent discloses a support member carrying a plurality of cable loops mounted thereon but the cable loops are aligned longitudinally of the axis of the body on which they are mounted. Thus, when the body is mounted on a tubular member and the tubular member lowered in a well bore to accomplish cleaning thereof, the flexible cable readily collapses and does not resist movement of the tubular member in the well bore sufficiently to accomplish the desired function in a most expeditious manner.

In those instances where the flexible cable loops of the prior art are mounted in aligned relationship longitudinally of the tubular member, some problem may be encountered in entering the well bore due to the fact that the longitudinally aligned cable loops may tend to more readily hang up on the edge of surface pipe as the tubular member on which they are carried is lowered into the well bore.

The present invention overcomes the above and other problems encountered with prior art well bore cleaners of the type described herein in that it provides an arrangement which tends to resist collapsing of the flexible cable loops when they engage the well bore wall to thereby attain a more efficient cleaning thereof.

In addition, the construction and arrangement of the helical loops of the present invention presents a configuration which may have less tendency to hang up as the tubular member on which they are carried is lowered in the well bore.

Another object of the present invention is to provide at least a pair of flexible cables mounted on a body to form helical cable loops with a portion of each cable loop facing in one direction and the other loop portion facing in an opposite direction, and with the helical cable loops being offset longitudinally relative to each other on the body on whcih they are mounted so that each cable loop which faces in one direction has a cable loop portion of another cable facing in the same direction and adjacent thereto.

Yet a further object of the present invention is to provide a helical cable loop arrangement of a well bore wall cleaner to provide a leading and trailing cable portion in each loop so that the flexible cable is forced to fold back against itself during movement of the member on which it is carried which causes the cable loop to more vigorously engage the well bore wall and attain a more efficient cleaning thereof.

Still another object of the present invention is to provide a plurality of helical cable loops on a support member adapted to be carried on a tubular member which provide a plurality of leading cable portions that face in the direction of movement of the tubular member as it is moved to engage the cable loops against the well bore wall for cleaning thereof.

Still another object of the present invention is to provide a plurality of helical cable loops on a support member adapted to be carried on a tubular member which provide a plurality of leading cable portions that face in the direction of movement of the tubular member as it is moved to engage the cable loops against the well bore wall for cleaning thereof, so that regardless of the direction of movement of the tubular member, there are a plurality of adjacent cable loops facing in the direction of such movement, and which cable loops must be forced to fold back upon themselves during movement of the member to clean the well bore wall to thereby more effectively force the flexible cable loops into contact with the well bore wall and attain cleaning thereof.

Other objects and advantages of the present invention will be come more readily apparent from consideration of the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view illustrating a pair of flexible cables mouned on a longitudinally extending member such cables being mounted to form a plurality of helical loops and with the loops of each cable being longitudinally offset to form in plan view a figure 8;

FIG. 2 is a side view of the form of invention illustrated in FIG. 1;

FIG. 3 is a section of a bore hole illustrating the form of the invention of FIGS. 1 and 2 mounted on the tubular member and diagrammatically illustrating engagement of the tubular member with the well bore wall.

FIG. 4 is a plan view illustrating the present invention mounted on an annular body which in turn may be secured on a tubular member and reciprocated in the well bore for cleaning the wall thereof;

FIG. 5 is an end view of the form of the invention shown in FIG. 4; and

FIG. 6 illustrates the invention of FIG. 4 in use in a well bore.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGS. 1 thru 6 illustrate the preferred embodiment of the present invention and attention is first directed to FIG. 1 of the drawings wherein a body referred to generally by the numeral **10** is illustrated and is shown as comprising a longitudinal strip **11** which, as more clearly seen in FIG. 3 includes a central portion **14** having the depending legs **15** and **16** to space the central portion **14** relative to the outer wall **18** of the tubular member **20** when the longitudinally extending body **10** is secured thereon by any suitable means such as spot welding as illustrated at **21** or the like. If desired a metal band **21***a* may engage each end portion **10***a* of member **10** and the ends thereof clamped by clamp **21***b* to aid in securing the body **10** on the tubular member.

A first flexible cable referred to generally at **25** may have its end **26** extending through an opening **27** in the body **10**, such end **26** resting against the inner surface **14***a* of the central portion **14** of the body **10**. Immediately adjacent the opening **27** are means for securing the end of the cable to the surface **14***b* of the central portion **14**, such means being referred to generally at **28** and being of any suitable form. It will be noted that the means **28** is disposed at an angle represented at **29** relative to the longitudinal axis represented by the dotted line **30**. The cable **25** is engaged by such means as well as the means **31** and **32** arranged at spaced intervals longitudinally of the member **10**. Each of the means **31** and **32** are also disposed at an angle which is the same as that represented at **29** relative to the longitudinal axis of the body **10** so that when the cable **25** is positioned therein and engaged thereby a plurality of

helical loops represented generally at **35** in FIG. **2** are formed. For purposes of description and discussion, it will be noted that only a pair of loops **35** are shown; however, any suitable number may be employed. Each helical loop **35** includes a loop portion **36** which faces in one direction and a loop portion **37** which faces in the opposite direction.

A second flexible cable referred to generally at **40** is shown as extending through a hole **39** for receiving the end **38** of the cable adjacent the inner surface **14***a* as described with regard to cable **25.** Securing means referred to generally at **42** is provided adjacent opening **29,** and additional securing means are spaced longitudinally of body **10** as indicated at **43** and **44.** The securing means **42, 43,** and **44** are also arranged at an angle which is generally the same as that represented by the numeral **29** relative to the longitudinal axis of the longitudinally extending body or strip **10.**

Additionally, the flexible cable **40** forms a plurality of loops represented by the numeral **45,** two of which are shown for purposes of illustration and description and each loop **45** includes a loop portion **46** facing in one direction and a loop portion **47** facing in the opposite direction.

It will be further noted that the cable loops **35** and **45** are offset longitudinally of body **10** so that the cable loop portions **36** of the cable **25** which face in one direction are adjacent but spaced laterally from the cable loops **47** of cable **40** which face in the other direction. Thus, the cable loop portions **36, 47, 46** and **37** cooperate to form a figure 8 in plan view as shown in FIG. **1** of the drawings.

Also, the cable loop portions **36, 46,** of each flexible cable **25** and **40** respectively are arranged adjacent each other and longitudinally of the body **10** and, when the body **10** is mounted on a tubular member and the tubular member rotated in the direction of the arrow **3***a* in FIG. **3** the cable loop portions **36,** and **46** face generally in the direction of movement of the tubular member to form leading cable portions which must be folded back upon themselves as each engages the well bore wall referred to generally at **2** in FIG. **3.** When this occurs, the action of folding back of each of the cable loop portions **36** and **46** is somewhat resisted thus causing the wiper of the present invention to more effectively and vigorously contact the well bore wall **2** and clean it. Similarly, if, for some reason, it should become desirable to rotate the tubular member **20** in a direction opposite of that represented by the arrow **3***a* in FIG. **2,** the cable portions **37** and **47** will then become the leading cable portions which must be folded back upon themselves as such rotation is accomplished. Additionally, the trailing cable portions **37,** and **47,** when the tubular member is rotated in the direction of the arrow **3***a*, engage the well bore wall **2** to assist in cleaning thereof.

It can therefore be appreciated that the present invention provides a plurality of overlapping cable loops each of which has a leading and trailing portion the construction of which tends to urge the flexible cables into intimate contact with the well bore wall for cleaning thereof. Whether the loop portions of the helical cables are trailing or leading will depend upon the direction of movement of member **20** in both the FIGS. **1–3** form of the invention as well as the reciprocating form of FIGS. **4–6.**

In FIG. **4,** a body **10** is illustrated as comprising an annular member **10***b* which has the flexible cables **25** and **40** secured thereto to form the offset helical cable loops **35** and **45** respectively. A means for securing each cable loop is similar to that described with regard to FIG. **1** and is illustrated at **28, 31** and **32** for the cable **35** and at **42, 43,** and **44** for the cable **40.**

FIG. **5** is an end view of the form of the invention illustrated in FIG. **4** and will be noted that the member **10***b* is suitably hinged as illustrated at **10***c* so that it may be opened and then secured in position about the tubular member which again is referred to at **20** in FIG. **6.** The well bore wall is represented at **2,** and in the form of the present invention the tubular member **20** is to be reciprocated to effect cleaning of the well bore wall. Thus a tack weld at circumferential intervals along the edge **10***f* may be desirable to aid in retaining the annular metal body member **10** in position along the tubular member **20.**

As the tubular member **20** is reciprocated, it can be appreciated that one cable loop portion of each cable again presents a leading portion in the direction of movement of the tubular member to more effectively and intimately contact the flexible cables with the well bore wall as the device is reciprocated for cleaning thereof.

The member **10***b* is shown as being hinged at **10***c* at diametrically opposed positions. The form of the hinge may be of any suitable type such as that shown in U.S. Pats. No. 3,276,522 and 3,416,804.

In practice, when the elongated metal body **10** of FIGS. **1–3** is used, several may be positioned on each joint of tubular member at longitudinally and circumferentially spaced realtionship to assure that the entire well bore wall is engaged as the tubular member **20** is rotated. Similarly, when the reciprocating form of FIGS. **4–6** is employed, a suitable number are provided at longitudinally spaced intervals on the tubular member **20** in a manner well known in the art.

The securing means **28, 31, 32, 42, 43** and **44** may be of any suitable form and comprises a portion of the members **10** and **10***b* which are stamped to form a clamp that engages the end of each cable loop in each of the flexible cables **25** and **40.**

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials as well as in the details of the illustrated construction may be made without departing from the spirit of the invention.

What is claimed is:

1. A well bore wall cleaner for mounting on a tubular member comprising:

a. a body;

b. a plurality of first helical cable loops mounted on said body so that a portion of each loop faces in one direction and the other loop portion faces in an opposte direction;

c. a plurality of second helical cable loops mounted on said body so that a portion of each loop faces in one direction and the other loop portion faces in an opposite direction, said first and second helical cable loops being offset on said body to overlap each other, whereby the overlapping loops generally form a figure 8 in plan view; and

d. means for mounting said body on a tubular member.

2. The invention of claim 1 including means for securing the end of each loop to said body and wherein said means is disposed at an angle relative to the longitudinal axis of said body to form the helical cable loops and hold the cable against movement to thereby maintain a desired loop size.

3. The invention of claim 1 wherein said body comprises an elongated strip for securing longitudinally of the tubular member so that the plurality of first and second helical loops form leading and trailing portions with the trailing portion of each loop being opposite the leading portion of another loop so that when the tubular member is rotated to clean the well bore the leading portions resist collapsing and engage the well bore wall for cleaning thereof.

4. The invention of claim 3 wherein said trailing portions also engage the well bore wall upon rotation of the tubular member for cleaning thereof.

5. The invention of claim 1 wherein said body comprises an annular member for securing on the tubular member so that the plurality of first and second helical loops form leading and trailing portions with the trailing portion of each loop being opposite the leading portion of another loop so that when the tubular member is reciprocated to clean the well bore there are a plurality of leading portions in the direction of movement of the tubular member which resist collapsing and engage the well bore wall for cleaning thereof.

6. The invention of claim 5 wherein said trailing portions also engage the well bore wall upon reciprocation of the tubular member for cleaning thereof.

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