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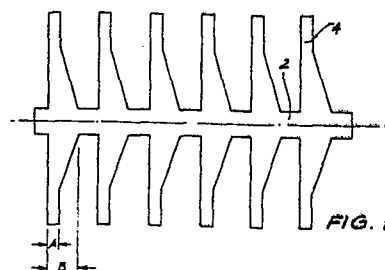
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(54) **Pipe cleaning device.**

(57) A pipe cleaning device, for water pipes, or pipework in chemical, petrochemical or gas installations has a flexible shaft (2) and multiple resilient discs (4) which are a push fit in the pipe, grouped on the shaft. The device is able to pass around pipe bends by the weight of fluid pressure. Various modes of disc slitting are disclosed. One-piece mouldings and composite versions are described.



PIPE CLEANING DEVICE

This invention concerns a device for scraping the internal surface of fluid conducting pipes. The device will be chiefly described in relation to water pipes made of metal but it will be understood that pipes used in oil and chemical installations may equally be cleaned physically by the device. Concrete pipes may also be treated.

Water mains are particularly troublesome in areas where the water contains ferric and ferrous salts in appreciable concentration. The iron content of these salts is sometimes visible in water samples as a flocculated sludge. This material may adhere to the surface of reticulation pipes and ultimately prevents valves in the pipes from sealing fully.

In one known method this is removed by subjecting section after section of pipe to a rodding technique or with hydraulic pressure using a dumbbell-shaped device with a rigid shaft, pairs of steel discs and rubber washers clamped between the discs. Such devices proved unreliable in use. They jammed on bends which were not plotted on official records of reticulation layouts or on minor obstructions such as protruding maincocks or stopvalve doors. Moreover the whole pipe section had to be drained before rodding began.

This invention seeks to provide a device which will negotiate bends and obstacles easily. This invention provides a device for scraping the internal surface of a fluid conducting pipe comprising at least one pair of preferably

mutually parallel discs made of resilient material which are a push fit into the pipe, said discs being mutually connected by a resilient support the separation of the discs being such as to permit the device to pass around bends without undue interference between the edges of the disc as the bend is passed. There may be 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 or more discs but we find 5 or 6 discs perform acceptably. The discs may taper in thickness toward the periphery to assist flexing during their passage. We have found that if the discs have a single radially directed slit, the whole device flexes better in use (kerfs allow unwanted liquid pressure drop). The slits may be mutually aligned in an axial direction. Alternatively, the slits in successive discs may lie at 90° to each other and this is the preferred arrangement, the reason being that the alternate discs provide baffles to the passage of liquid.

Conveniently the article will be moulded in one piece or as a double article being divided after moulding. In order to open and close the mould easily, the discs are moulded in parallel conformation but this relationship is not critical and the discs may be in planes which are at an angle to each other providing they do not interfere with the ability of the device to negotiate bends. The Shore "A" hardness of the rubber may be about 80.

One embodiment of the invention is now described with reference to the accompanying drawings in which:

Fig.1 is a sectional side elevation of the device.

Fig.2 is an end view thereof.

Fig.3 is a fragmented sectional side view of another embodiment.

Referring now to the drawings, the device for a 150 mm. nominal bore main consists of a one piece rubber moulding having a shaft ^{which is} 2,325 mm. long and ^{having} a diameter of 35 mm. There are five integral discs, 4 of 155 mm. diameter. Each disc tapers in thickness from the shaft to the periphery in the manner shown, the thickness A being 10 mm. or less, B being 15 mm. which improves the deformation characteristics. Each disc is spaced from the next by a distance of 80 mm. measured flat face to flat face. Radial slits 6 extend from periphery to shaft in each disc in a north/south direction.

In another embodiment, which is used for cleaning four-inch diameter water mains, the shaft is 230 mm. long with a diameter of 35 mm. There are six discs each of 106 mm. diameter. Each disc tapers to the periphery as illustrated, thickness A being 2 mm., B being 77 mm. and adjacent discs are separated by a distance of 42 mm. measured flat face to flat face.

In Fig. 3 discs 4 are not tapered in thickness, instead they have cruciform ribs 8. A length of multistrand wire cable 10 acts as the shaft and the discs 4 are separated by collars 12. These are all held together by a pair of bronze collars 14, loosely enough to permit flexure.

When a pipe, for example a water main, is to be cleaned the procedure is as follows. In the street to be cleaned the pipe is cut 3 metres from the valve and also at the dead

end or 3 metres from another valve. All house services are isolated and a 750 mm. section of pipe removed. The cleaner is inserted in the pipe, ensuring a firm fit (tapering of the cleaner is required), and the pipe reconnected using gibault couplings. A flexible hose may be connected to the receiving end to avoid property damage from the water. The valve is then opened (about four turns depending on head), and water (and/or air) pushes the cleaner through the pipe. When the cleaner exits from the open end the main is flushed clean, then the pipe is reconnected and chlorinated prior to returning to service.

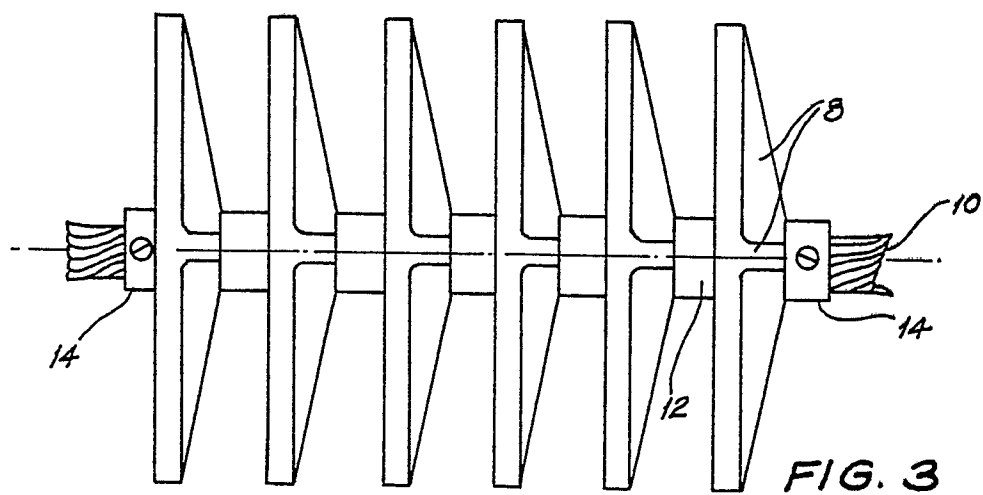
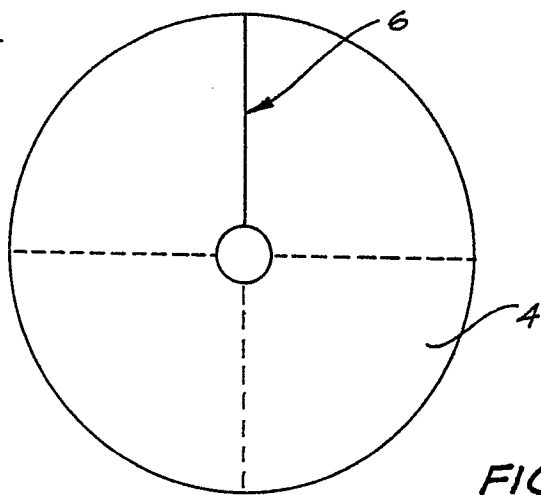
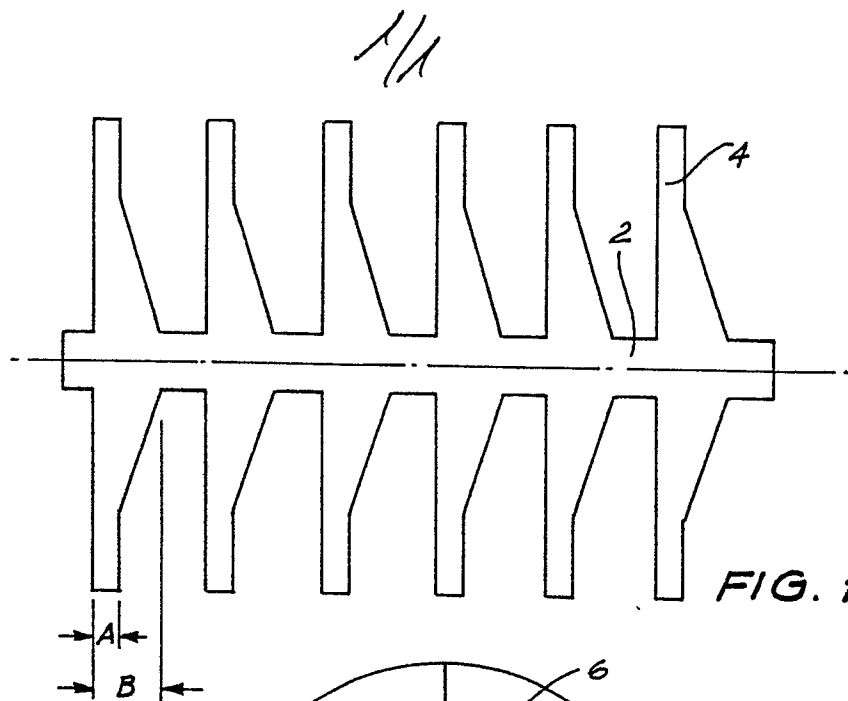
We have found the advantages of the embodiment described above to be a good scouring action in one pass; the ability to flex around pipe bends to pass through valves and to move past obstructions within the pipe; the resistance to undue deformation tending to cause the device to stick in the pipe.

Although the device has been described in relation to its use for cleaning water mains, clearly it may also be used in chemical plant, petrochemical installations, gas pipelines and the like.

CLAIMS:

1. A device for scraping the internal surface of a fluid-conducting pipe comprising
at least one pair of ganged discs made of resilient
material which discs are a push fit into the pipe, the
discs being mutually connected by a flexible central
support, the separation of the discs being such as to
permit the device to pass around bends without undue
interference between the disc edges as the bend is passed.
2. A device as claimed in Claim 1
wherein the discs are mutually parallel and perpendicular
to the axis of the support.
3. A device as claimed in Claim 1 or 2
wherein there are multiple discs mutually separated by
a distance of the order of a half of the disc diameter,
the support being of the order of a quarter of the disc
diameter.
4. A device as claimed in any one of the preceding Claims
wherein the discs taper in thickness toward the
periphery.
5. A device as claimed in any one of the preceding claims
wherein at least some of the discs have a slit extending
from near the support to the periphery.
6. A device as claimed in Claim 5
wherein the slit extends diametrically across the discs
from the support to mutually opposite loci on the disc
periphery.

7. A device as claimed in Claims 5 and 6 wherein the slits of successive discs lie at 90° to each other.
8. A device as claimed in any one of the preceding claims wherein the support is a shaft which together with the discs constitutes a one piece moulding.
9. A device as claimed in any one of the Claims 1 to 7 wherein
the support is a flexible, elongated tie upon which the discs are threaded, but separated by spacers and urged together by a pair of abutments, one anchored at mutually opposite ends of the tie.
10. A device as claimed in Claim 8 when moulded in urethane rubber.
11. A device for scraping the internal surface of a fluid-conducting pipe, constructed and adapted for use substantially as herein described, with reference to and as illustrated in Figs. 1 or 2 or as modified in Fig.3 of the accompanying drawings.





European Patent
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EUROPEAN SEARCH REPORT

0063024

Application number

EP 82301816.3

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	US - A - 3 857 132 (KNAPP) * Column 2, lines 51,52; column 3, lines 6,62-64; fig. 4-6 *	1,2,4,8,10	B 08 B 9/04
A	US - A - 4 178 649 (KOUSE) * Column 1, lines 49-50; column 2, line 19; column 3, lines 9-14, 20-24; fig. *	1,2,5,6	
A	GB - A - 1 356 460 (IRA) * Lines 40-53; claim 1; fig. 1,2 *	1,2,5,6,9	TECHNICAL FIELDS SEARCHED (Int.Cl. 3)
A	US - A - 3 619 844 (COLLINS) * Column 2, lines 1,2; column 3, lines 21-33; claim 5; fig. 1 *	1,2,5,6,9,10	B 08 B 9/00
P,A	US - A - 4 275 457 (SCHWARTZ) (30-06-1981) * Column 2, lines 51,52,62,63; column 3, lines 6-9, 52-54; column 4, lines 13-16; fig. 1,4 *	1-3,9	
A	US - A - 1 218 005 (SCHLEMMER) * Page 1, lines 94-97, 101-104; page 2, lines 45-63, 113-115; claims 3,11; fig. 1,2,6,7 *	1,5,6,9	CATEGORY OF CITED DOCUMENTS
			X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons
The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search		Date of completion of the search	Examiner
VIENNA		26-05-1982	TROJAN