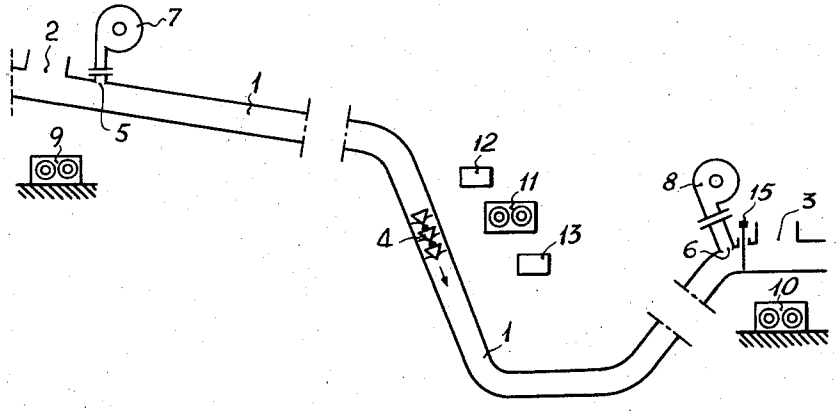
Feb. 17, 1959 A. G. REINHART 2,874,078

PIPE CLEANING METHOD

Filed April 14, 1954



INVENTOR
Alberto G. Reinhart
BY A. John Michel
ATTORNEY

United States Patent Office 2,874,078 Patented Feb. 17, 1959

2,874,078

PIPE CLEANING METHOD

Alberto G. Reinhart, Lugano, Switzerland

Application April 14, 1954, Serial No. 423,157

2 Claims. (Cl. 134—8)

The present invention is intended to provide an economical process for mechanically cleaning piping used for transporting fluids, which piping, as known, clogs with deposits of materials, scale, rust and the like.

Heretofore, cleaning was effected by means of scrapers pulled by ropes or pushed by water or air pressure, but the results of the operation were very defective due to jamming of the scraper which got blocked either on account of the accumulation of the waste or detritus in the piping, or on account of the configuration of the pipe immobilizing it, with no possibility of setting it in motion again. This entailed the cutting open of the pipe in which the scraper had jammed, but this operation was a difficult one due to the impossibility of establishing with certainty the point where the scraper had stopped.

The process of the present invention makes it possible to successfully effect the cleaning of even very long pipes carrying fluids (water, gas and the like) and is characterized by this, that at each end of the pipe section to be cleaned an access aperture is prepared for the introduction or the extraction of a scraping appliance, and that at least at one of said ends a pump also is arranged to establish behind the scraping appliance the pressure required for moving it forward in the pipe, whose section is not entirely filled by the scraping appliance, so that its speed is kept below the speed of the current in which it moves, said current being intended to dispose of the detritus detached by the scraping appliance, and further characterized by this, that at each end of the piping a radio receiving and transmitting apparatus is placed, in order to communicate with a third movable radio receiving and transmitting set carried by a technical operator together with at least one apparatus able to locate from the outside the position of the scraping appliance, said technical man following the travel of the scraping device along the piping and transmitting to the end stations the orders for regulating, by means of the pump, the pressure of the fluid acting upon the scraping appliance and thereby the quantity and speed of said fluid as well as the forward feed of the scraping appliance.

The invention further relates to an equipment for carrying out the process.

The annexed drawing represents in a very schematic way an example of one embodiment of the equipment according to the invention.

In said drawing 1 indicates the piping to be cleaned in which an access aperture 2 at the inlet end and an access aperture 3 at the exit end has been prepared, for the introduction and extraction of the scraper 4, drawn inside the piping.

At each end branchings 5, 6 are also provided for water pumps 7, 8 to establish, after having previously closed the piping at its downstream end, the necessary pressure and consequently the quantity of water necessary to cause scraper 4 to travel forward along the piping.

The installation is completed by three radio transmitting and receiving apparatuses 9, 10 and 11, the two first ones being stationary at the ends of the piping and the last one, which is movable, being carried by an operator.

The latter, provided also with a radio-activity detector 12, of the Geiger type for example, which presupposes that the scraping appliance has been rendered radio-active, for instance by the addition of a radio-active material containing cap, and with stethoscope 13, follows the travel of the scraper and gives orders to the two men standing at the ends to so regulate the operation of at least one of pumps 7 and 8 that the scraper 4 travels forward at a speed comprised between 4 and 6 kms. an hour.

Between the pipe and the scraping appliance there is a clearance, wherefore the water current travels faster than the scraping tool.

This provision, the clearance being open and the water quantity well adjusted, makes it possible to carry all detritus detached by the scraper away and to leave at all times a free action to the tool which can operate with no difficulty or hindrance.

The process of the present invention can be applied to water pipe lines of any slope, even syphon shaped ones, and eventually also to gas pipe.

In the case of vertical water lines with a high head, in order to maintain the scraping device 4 at the proper speed, which is ordinarily between 4 and 6 kms. an hour, to the end of permitting the supervising technical man to follow it on foot with his apparatus, it will be necessary to create downstream of the line a counter pressure by means of the closure or adjustment of gate valve 15 provided in the downstream equipment or else by utilizing pump 8 as a force instead of suction pump. Still, the water velocity must at all times be higher than that of the scraping device.

Such a regulation of the gate valve and of the downstream pump will be directed by radio set 11 carried by the technical man when he notices that the velocity gained by the scraping device 4 has become excessive.

The pressure created upstream or the counterpressure created downstream on the scraping device and definitely at the end of conduit section 1 to be cleaned, can vary according to the obstacles presented by the pipe (incrustations, detritus, bends) and to the slope of the conduit.

The fundamental idea to be followed is to maintain the scraper at a speed suitable to a good execution of the cleaning operation; that is in practice, within the above mentioned limits and to keep it at the same time moving ahead along the whole distance together with a copious current of fluid advancing with a greater speed than the scraping appliance, so as to shove ahead all of the detritus the scraping organ of the latter removes from the wall. Thus no detritus can accumulated in front of the scraping appliance with the consequence of stopping it.

The scraping device used may be of any known type, but, preferably, the one on the market is to be used, which comprises several articulated and chainwise interconnected elements, of which at least two following ones are formed by frusto-pyramidal walls with radial side projecting knives. Back of said two elements two cross discs are arranged, having a diameter nearly equal to the diameter of the pipe to be cleaned, provided at their periphery with leather and rubber gaskets, but also provided with apertures whose area constitutes at least 30% of the section of said discs and therefore also of the pipe, permitting the passage of a quantity of fluid sufficient, as said, to drag along all of the detritus removed by the scraping device and let the latter freely advance at all times, leaving ahead of it nothing but the material incrusting the walls of the pipe to be cleaned.

The frusto-pyramidal wings and the radial knives of the scraping device are of steel, to the end of presenting a certain elasticity guaranteeing the adherence of the knives to the pipe walls. The scraping device may com-

prise other elements; such as brushes, blades, knives and the like suitable for removing the various kind of detritus found in the pipe to be cleaned.

Should the process be applied to the cleaning of gas piping in which the wall incrustations consist of distillate residuum, as a propelling and draining medium a diluting agent (for instance toluol, alone or mixed with other solvent) should be used and at the end of the piping a basin should be provided for recuperating and filtering such diluent which can be re-cycled.

Such a provision is generally not necessary when using water, but should the latter be scarce, as it happens in some countries a filtering and recuperating apparatus should be provided for the water delivered under the necessary pressure into the piping by pump **7** upstream of the scraping device and flowing out of the downstream end.

I claim:

1. The method of mechanically cleaning a pipe with a scraping device which comprises the steps of opening one end of the pipe to be cleaned, inserting said scraping device freely floating into said pipe opening, forcing a liquid into the same end of said pipe, applying pumping pressure at both ends of the pipe to drive said scraping device through said pipe while permitting said liquid to flow past said scraping device at a predetermined rate, so as to cause said liquid to move at a faster rate than

said device through said pipe, and controlling the rate of movement of the device therein by controlling the pumping rate at least at one end of the pipe.

2. The method of mechanically cleaning a pipe with a scraping device, as defined in claim 1, further comprising the steps of detecting the whereabouts of the device in the pipe at all times so as to ascertain the rate of movement of said device, and transmitting this information to points adjacent the ends of the said pipe, whereby the pumping rate at least at one end may be adjusted to maintain a predetermined rate of movement of said device.

References Cited in the file of this patent

UNITED STATES PATENTS

335,608	Messer	Feb. 9, 1886
616,696	Cochran	Dec. 27, 1898
775,679	Nowotny	Nov. 22, 1904
1,156,417	McCarty	Oct. 12, 1915
1,662,429	Lowy	Mar. 13, 1928
2,255,914	Crane	Sept. 16, 1941
2,258,174	Chawner	Oct. 7, 1941
2,601,248	Brenholdt	June 24, 1952
2,617,134	Barton	Nov. 11, 1952
2,745,231	Prince	May 15, 1956