(No Model.)

E. H. KEATING.

APPARATUS FOR REMOVING INCRUSTATIONS FROM WATER MAINS AND PIPES.

No. 302,634. Patented July 29, 1884.

Fig. 1.

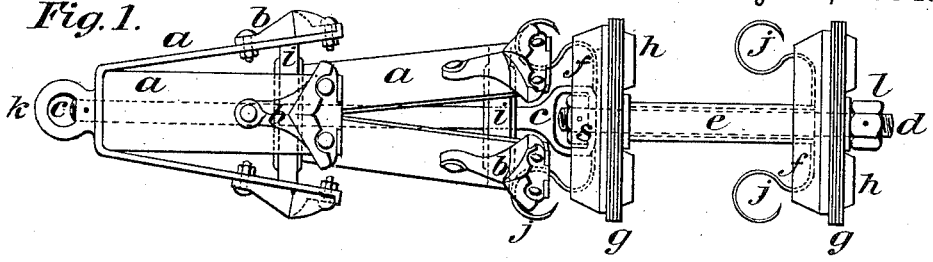


Fig. 2.

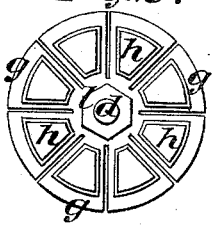


Fig. 3.

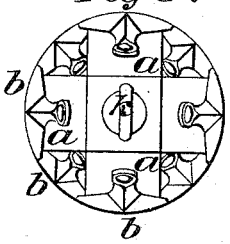


Fig. 4.

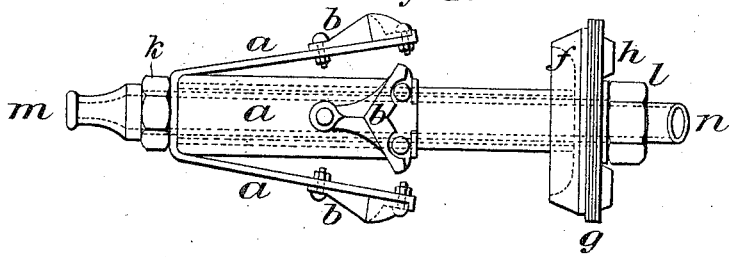
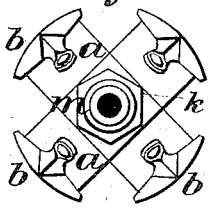


Fig. 5.



Witnesses:

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APPARATUS FOR REMOVING INCRUSTATIONS FROM WATER MAINS AND PIPES.

SPECIFICATION forming part of Letters Patent No. 302,634, dated July 29, 1884.

Application filed December 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HENRY KEATING, of the city of Halifax, in the Province of Nova Scotia and Dominion of Canada, have invented certain new and useful Improvements in Pipe-Cleaning Devices and Apparatus, of which the following is a specification.

My invention relates to new and useful apparatus for cleaning out, by hydraulic pressure, any water-pipe or water-main which may have become foul or obstructed by incrustations, sediment, stones, or other substances; and the objects of my invention are to remove all such obstructions effectively, rapidly, and cheaply, and to restore the pipes to their original condition and capacity by the means and use of compound plowing-machines or machine-scrapers, which are propelled and operated by the natural gravity, force, or power of the water furnished from the reservoir or "fountain-head," or from the ordinary stationary engines in localities where direct pumping-works are established. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the entire machine I use in ordinary cases. Fig. 2 is a rear view, and Fig. 3 a front view, of the same. Fig. 4 is a side view of a modified machine I use in special cases when the incrustations or obstructions are exceptionally dense or heavy. In this figure one of the pistons and four of the arms and plows are detached. The center rod, which may be either hollow or solid, is shown to be hollow, with a nozzle at the forward end, the object being to have a powerful jet of water playing immediately in front of the machine, with the view of preventing accumulations from forming there and impeding its course. Fig. 5 is a front view of the modified machine, the rear view of which is the same in appearance as Fig. 2.

Similar letters refer to similar parts throughout the several views.

c c d is the center main rod or backbone of the machine, to which all the working parts are attached, and of which *d* is the rear end. It is in two parts, coupled together by the swivel-joint *s*, which admits of a certain amount of play in either part, in order to enable the machine to pass around ordinary bends or angles in the pipe-line, and also admitting the plows to turn and pass without causing injury in case any of them should strike against some solid and firm object, such as a ferrule or service stop-cock projecting into the pipe, and which might otherwise cause the machine to stop.

f g h are combination-pistons, against which the water from the "fountain-head" or source of supply impinges, and the force or power of the water is concentrated in order to propel the machinery. These pistons do not rake, scrape, or clean the pipes, but act in the same manner as the pistons in an ordinary engine.

f represents a heavy, strong, and rigid metal casting, which gives solidity to the combination.

g represents a portion of the piston, composed of one or more thicknesses of rubber or some other suitable and flexible material, riveted or secured to similar but smaller segments *h* of wood, metal, or composition, as shown in Fig. 2, and so designed as to be capable of yielding backward only. The object of this arrangement is that in case a pipe of somewhat smaller diameter than that under treatment is met, or one which is not truly cylindrical, the machine will yet be able to proceed on its course. The segments represented by the letter *h* are intended to give sufficient stiffness to the flexible parts *g*.

e is a metal tube surrounding the rear part of the center or main rod, *c d*, and separating the pistons by any desired distance when more than one is attached.

a a a are strong spring-metal arms, bent backward against the flow of the water, and so disposed as to be capable of yielding inward when any undue pressure is brought upon them.

b b b are the plows or scrapers, having a sharp cutting edge or knife in front, and the shares or sides flaring backward and fitting closely to the internal surface of the pipe. These plows are intended to cut, separate, detach, and remove all obstructions which may come in their way, and by being secured by bolts and nuts to the arms any number of them may readily be attached to or detached from the machine at pleasure, according as the circumstances of the case may seem to require, the number of plows depending upon the number of arms which the machine may be adapted to carry.

k and *l* are strong and substantial metal nuts

holding the whole machine securely together, *k* being the forward end, and *l* the rear end, of the machine. By unscrewing these nuts the machine may be readily taken apart, repaired, and put together again by any ordinary mechanic.

j represents the springs, which are intended to maintain the machine in its proper position in the center of the pipe. These springs, when required, I usually attach as shown in Fig. 1; but if the machine is a small or light one, or if for other reasons it is deemed advisable to dispense with them, as in the case of the modified machine, I detach and omit them, as shown in Fig. 4.

i i represent additional springs of rubber or some other flexible substance, which I attach to the center rod, as shown, when I require to force the arms outward, so as to make the machine fit a pipe of larger diameter than that for which it was originally designed, or when I require the plows or scrapers to have a firmer grip against the interior surface of the pipe than the spring-metal arms are capable of affording. These auxiliary springs are not in all cases essential to the proper operation of the apparatus, and consequently are not shown on the modified machine, Fig. 4.

m n is the center rod of the modified machine, which may be either solid or hollow. In Fig. 4 it is shown to be hollow, *m* being the forward end or nozzle, from which a jet of water issues under pressure, for the purpose hereinbefore described.

I am aware that a patent was granted to James Hodges Dann, January 30, 1872, No. 123,155, in which transverse semicircular scrapers are attached to spring-steel arms projecting forward, the whole machine being worked by a handle, and being applicable solely to boiler-flues. In my machinery the plows or scrapers are not semicircular, nor do they resemble his. My springing arms *a a a* do not project forward, but are bent backward. No handle is required, and the machine is not adapted to boiler-flues.

I am also aware that a patent was granted to Samuel Phillips, May 16, 1876, No. 177,421, for devices for cleaning mud and sediment from sewers and pipes, in which he employs a loosely-fitting movable dam, with openings around the sides, and a hollow guiding-arm, the whole being propelled by the water dammed up behind the device; but my machinery is different in principle and construction, cannot be driven by the mere force of running water, which may be impounded behind it, but requires the power given from a definite or sufficient head or force, and is eminently more effective in its action. My hollow center rod is for a different purpose, and acts in a different way from his hollow guiding-arm, which can only have effect on mud or similar soft material on the bottom of a sewer.

I am also acquainted with the patent granted to Van Slooten, Hunt, and McCulloch, July 5, 1870, No. 105,015, for pipe-cleaning apparatus, in which a piston or disk or series of disks armed with cleaning-springs, wires, bristles, or brushes is operated by special pumping appliances connecting the pipe with a hose from an engine, and requiring the pipe or main to be disconnected at its upper end, and a tightly-fitting cap base or stop applied thereto. My machinery is entirely different from this in design, appearance, construction, principle, and mode of operation. My plows or scrapers are not attached to the pistons, but are on independent arms separated from them. My pistons are of different construction, and are not armed with wires, bristles, brushes, or cleaning-springs, except the springs *j*, which are not essential, and which perform no part of the work as cleaners, but are for a different purpose, as specified herein. I require no special pumping-machinery, engines, hose, or other appliances, in order to obtain the power needed, and I use no special cap, base, or stop at the upper end of the pipe, or at any other part of the pipe-line or elsewhere.

I therefore claim and desire to secure by Letters Patent—

1. The combination, with a central rod or backbone, *c*, screw-threaded at its end, and a nut, *k*, engaging said thread, of a spring, *a*, perforated midway to receive the said screw, and bent back toward the central rod at each side of the perforation, and scrapers *b*, secured to the rear ends of the springs *a*, substantially as described, whereby the scrapers will swing backward and inward on meeting obstructions which resist their forward movement.

2. The combination, with the rod *c*, the springs *a*, secured thereon as described, and the scrapers *b*, attached to the springs *a*, of the spring *i*, encircling the rod *c*, beneath the springs *a*, as and for the purpose specified.

3. The combination, with the rod *c*, and the scraper described secured thereon, of the rod *d*, secured endwise thereto by a link-joint, and a partly-rigid and partly-flexible piston, *f g*, secured upon the rod *d*, as and for the purpose specified.

4. The combination, with the rod *c*, having thereon the scrapers described, and the rod *d*, linked thereto, having the piston described, of the guiding-springs *j*, secured to the rod *d*, near the link-joint, as and for the purpose specified.

5. The combination, with the rod *c*, and the scraper described secured thereon, and the rod *d*, linked thereto, of the piston consisting of the rigid head *f*, secured to rod *d*, the radially-slotted disk *g*, and the stiffening-pieces *h*, secured upon the sectors of disk *g*, as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD H. KEATING.

Witnesses:
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C. M. IMLAN.