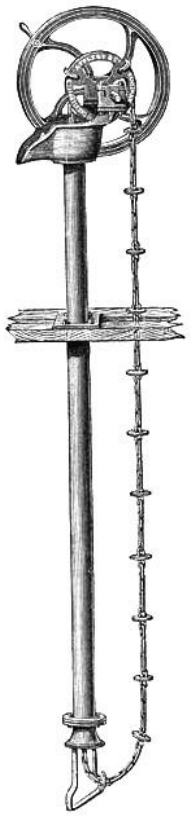
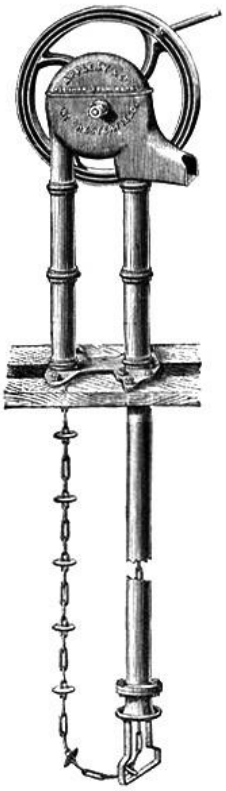
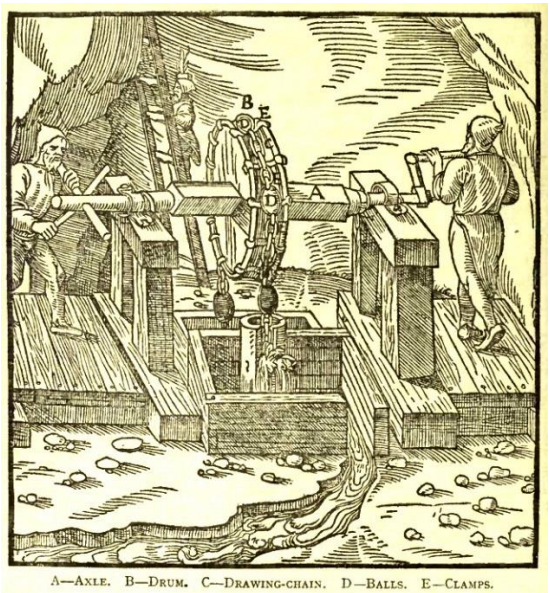
CHAIN PUMPS

The chain pump uses a very simple mechanism, involving no valves whatsoever, or even any seals. Instead, a continuous chain carrying a series of flat metal discs runs within a barrel that's marginally wider in diameter than the discs. The bottom end of the barrel is open to the water source. At the top of the pump the chain runs around a toothed wheel, which is connected to a hand-operated flywheel. As the flywheel is rotated, so the discs on the chain rise up the barrel, trapping water. As each disc reaches close to the top of its travel it discharges its water and then continues on its journey back to the water source, sometimes via a protective return barrel.		

The concept is ancient, the chain pump having been known to the Greeks and Romans, and there's an immediately recognisable chain pump depicted in *De Re Metallica*, written by Georgius Agricola in 1556.



A—Axle. B—Drum. C—Drawing-chain. D—Balls. E—Clamps.

In this woodcut illustration the pump can be seen to involve a series of balls instead of discs, and even earlier versions were described as rag-and-chain pumps.

I've found a number of old catalogue entries and one, from 1881, stated that they had come up with a new design that included a "neat cover over the wheel to prevent splashing". And that of late these pumps had "come into extensive use for lifting thick muddy water, liquid manure, gas tar, &c".

Other advertisements claimed that: "These pumps are proved to be the most durable, simple and cheapest pump ever made. They will pump more liquid than any other kind, and are not liable to get out of order. Frost will not crack them, as they are empty when not in use. [I take this to mean that the water must drain back down the barrel]. They have no valves or buckets, and cannot possibly be injured by fair usage. Thousands are now in general use for Liquid Manure, Hot and Cold Water, Gas Tar, Sewage, Pulpy Matter, Grease, Clay Wash, Brick Makers', Potters', Contractors' and Builder's uses, emptying Cesspools, Urine Tanks, Drainage, Irrigation and Sanitary purposes, by Local Boards of Health, Prisons, Asylums, Gas Companies, etc."

With barrels of 2½ - 3½" diameter, they were advertised as being able to deliver 800-5000 gallons of liquid/per hour. The adverts don't mention the amount of manual effort involved though, and it was unusual to find one that was offered with any gearing mechanism to assist the operator. One manufacturer offered a model that included a ratchet & pawl, which might have allowed an opportunity for a rest without the barrel draining itself too quickly. Latterly, at least one manufacturer provided a means of connecting an external mechanical drive, either via a pulley and belt or a simple drive shaft.

A specialised version was introduced for public use by The Safety Water Elevator Company, which used a series of buckets on the chain instead of discs, and their advertisement shows it being used by children, suggesting that it was easy to use. But surely not to bring water up from an advertised maximum depth of 1000 ft? Just imagine the weight of the chain, buckets and water.

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