

CHAPTER VIII

THE DISTRIBUTION SYSTEM

Comes facundus in via pro vehiculo est.

PUBLILIUS SYRUS (abt. 50 B. C.), 104.

A talkative companion is as good on the way as a wagon.

BEGINNING Book II. (Chapter 64), Frontinus takes up the distribution system of the City of Rome in his day, until, in Chapter 87, we have another one of his favorite exclamatory passages, expressing satisfaction with what has been and still is proposed to be done for his pet, the "Eternal City." We have commented, up to this point, upon the aqueducts, from their sources down to their entrance into the city, and may now see what became of the water they carried.

The aqueducts ended at various points and at various elevations within the city, generally in form of a cistern or delivery tank, called a *castellum*. Thence were laid lead pipe to other cisterns, for public and for private consumers, to fountains, water-basins, and elsewhere. Thus, *castra* were the military camps, or barracks; *opera publica*, the public buildings or other structures, exclusive of those belonging to the emperor, — the water supplied to these last was termed *in nomine Caesaris*. *Lacus* and *salientes*¹ were public basins and jet-fountains; *munera* were the large ornamental fountains; *beneficia Caesaris* were the imperial grants to private consumers. Says Frontinus: 115. "This mode of gaining money practised by the water-men is also to be abolished, the one called 'tapping.' Far away, and in all directions, run the pipes under the city pavements. I discovered that these pipes were furnishing water by special branches to all whom they passed and who had been able to arrange² for it; being

¹ Middleton, ii. 349-350.

² The Tammany equivalent, 1898, for this word "arrange" would be "to see" the water-men.

bored for that purpose here and there by the so-called tappers; whence it came that only a small quantity of water reached the places of public supply. The amount of water gained in consequence of our abatement of this evil I measure by means of the fact that we have gathered a large quantity of lead by the removal of that kind of branch pipes." This gives a vivid picture, incidentally, of the common and extensive use made of lead pipe at the time.

These lead pipes have been dug up literally by the ton. So late as 1878, Prince Torlonia melted down a ton of them dug up on his land alone. But in so doing he deprived modern antiquarians of a great treat.¹ Prof. Rodolfo Lanciani, of Rome, has made a special study of these Roman lead pipes, and by means of the inscriptions in raised letters ordinarily found upon them, and evidently produced by engraved rollers used in rolling the lead plates out of which the pipes were made, has been led to make some curious discoveries.² He has located by means of them the residences of some eighty or ninety distinguished citizens. He also finds that there were female plumbers in ancient Rome, as well as female householders; but, as a lady wittily remarked on hearing this, whether a female plumber in ancient times was any more reliable than the male plumber of modern times the records so far discovered do not say. Presumably these female names signify the owners of plumber shops operated by slaves.

The list of names of these artificers would lead one to suppose that their lines had fallen in pleasant places. "The Fortunate One," "The Happy One," "Happiest of All," "The Hilarious One," "Skilful One," "Flourishing One," "Of Beautiful Form," are some examples. Christian plumbers of that time may also be distinguished occasionally from their pagan brethren.

The rule is that on one side these pipes hold the name of the proprietor, or rather life-lessee of the right to draw water through that pipe, while on the other side is the name of the plumber who made it.

The fact that the water-right had been granted by an emperor was frequently marked on the pipe; and when it had been a gift from the emperor, this was noted by means of the words *ex liberalitate*.

¹ Middleton.

² Henzen, *Ann. Inst.*, 1864, p. 6; Mommsen, *Bull. Inst.*, 1866, p. 127; Middleton, ii. 331, 335.

The numbers cast on the pipes have long puzzled the antiquarians. They do not represent sizes or stations. So much has been determined. Perhaps they are mere shop numbers, serving to distinguish and identify the several lengths, and to bring home responsibility in cases of failure of the pipes at any point,—just such numbers as are now cast on cast-iron pipe lengths. In Rome such pipes have been



LEAD AND TERRA-COTTA PIPE.¹

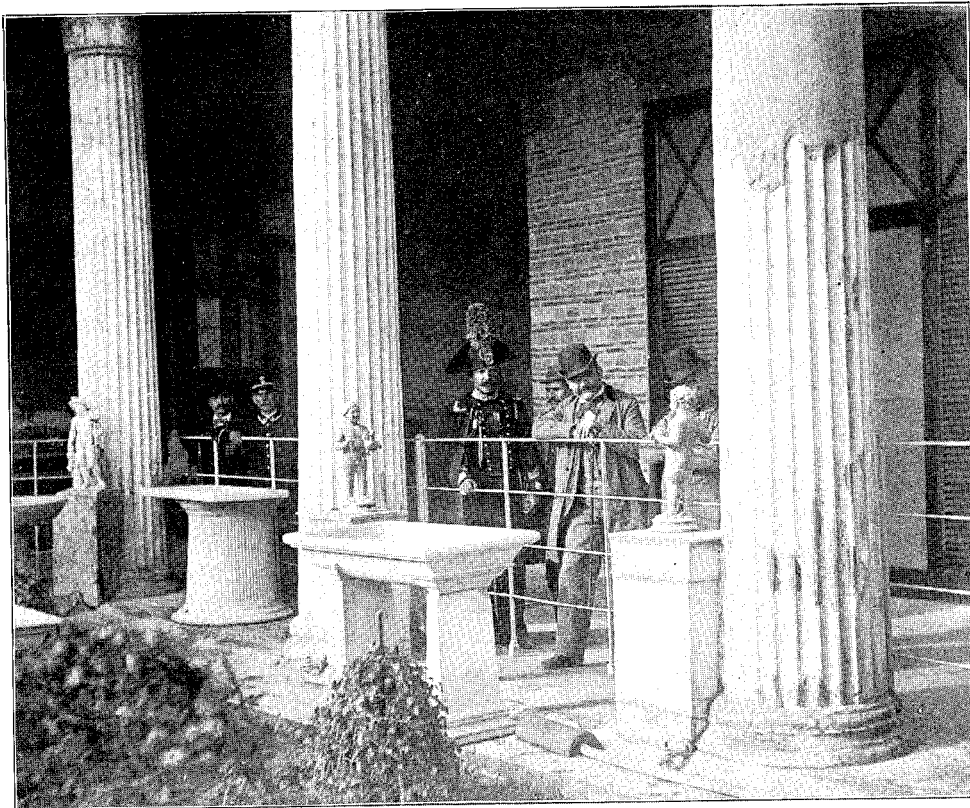
found up to twenty-seven inches diameter; also up to nearly one and one quarter inches in thickness when only five inches in diameter.² Ancient Roman shears to cut sheet-lead, made precisely like tinsmith's shears of the present day, have been found in Rome.

As already stated, these lead pipes were made by bending lead plates, of the proper width, and some ten feet long, into a pear-shaped cross-section, or something like the Greek letter "omega," then soldering the longitudinal joint. The solder used was pure lead. That

¹ Collection of lead and terra-cotta pipe in the Magazzino Archeologico at Rome. From a photograph taken by the author.

² Lanciani, *The Ruins*, etc., pp. 186, 434, 531.

used in pipes dug up in Lyons, in Paris of the second century, as well as that used in Pompeian pipes, contained not a trace of tin.¹ I have been unable to find when the modern method of soldering with an alloy of tin and lead, and with copper points, first came into use, or when lead pipes were first made without a seam, by cold drawing, or by



LEAD PIPE, STOP-COCKS, AND FOUNTAIN FIGURES IN THE GARDEN OF THE HOUSE OF VETTI, POMPEII.²

the hot method now used.³ Belgrand, a noted French engineer, caused a lead pipe to be made in imitation of the Roman method of bending the lead plate into a pear-shaped cross-section, and soldering it by pouring

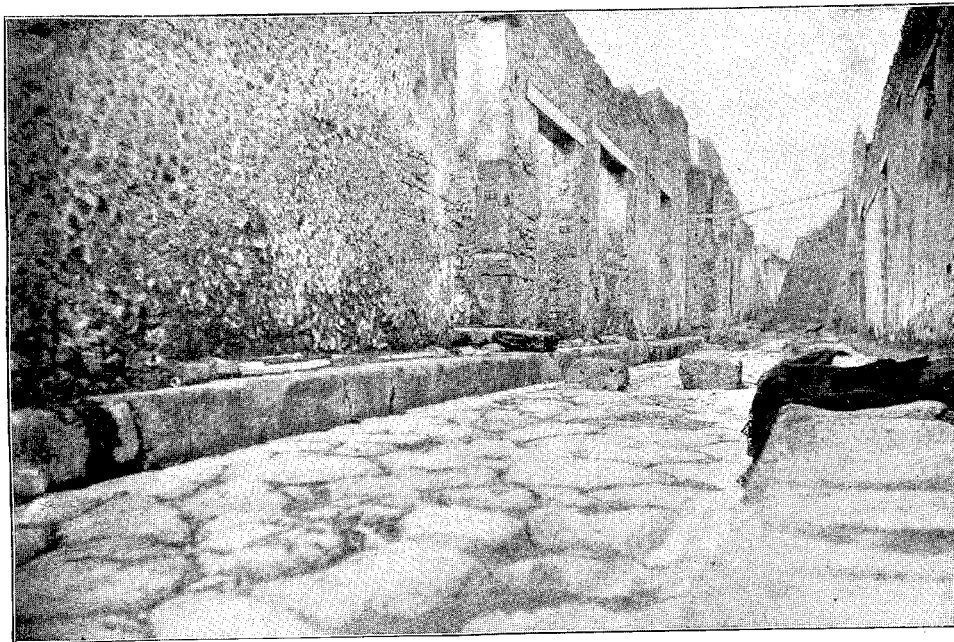
¹ Belgrand. Lead pipe laid for Cardinal Wolsey between 1515 and 1530, and dug up in 1898, are soldered; "seam and joint were made by an overlay."

² From a photograph taken by the author. More than twenty of these little fountain figures in this garden, with water properly "laid on" to each of them.

³ Pliny, *Nat. Hist.* xxxiv. 48, gives the recipe for solder: two parts lead + one part tin. Belgrand, p. 70.

melted lead on the joint. He found on testing it, the plate being about one fourth inch thick, and the pipe, when rounded, about four inches in diameter, that at 45 pounds pressure the pipe began to assume a circular section; at 112 pounds it was a circular pipe; and it failed at 250 pounds, without failing at the joint.¹

Sometimes these lead pipes were laid in subways, instead of being buried in the ground. A notable example was the lead pipe that fed



LEAD PIPE LAID IN THE STREETS OF POMPEII ON THE SIDEWALKS.²

Meta Sudans, a large fountain near the Colosseum, whose brick core remains and forms a prominent landmark in front of the Arch of Constantine.³

In Pompeii, the lead pipes are, as a rule, not buried in the ground. In the garden of the house of Vetti, the lead pipes and branches to the twenty or thirty little fountains it contained, with their little plug-cocks in each branch, are still in place, as also the main pipe laid in the gutter that surrounds the garden. In the streets, they are laid on the

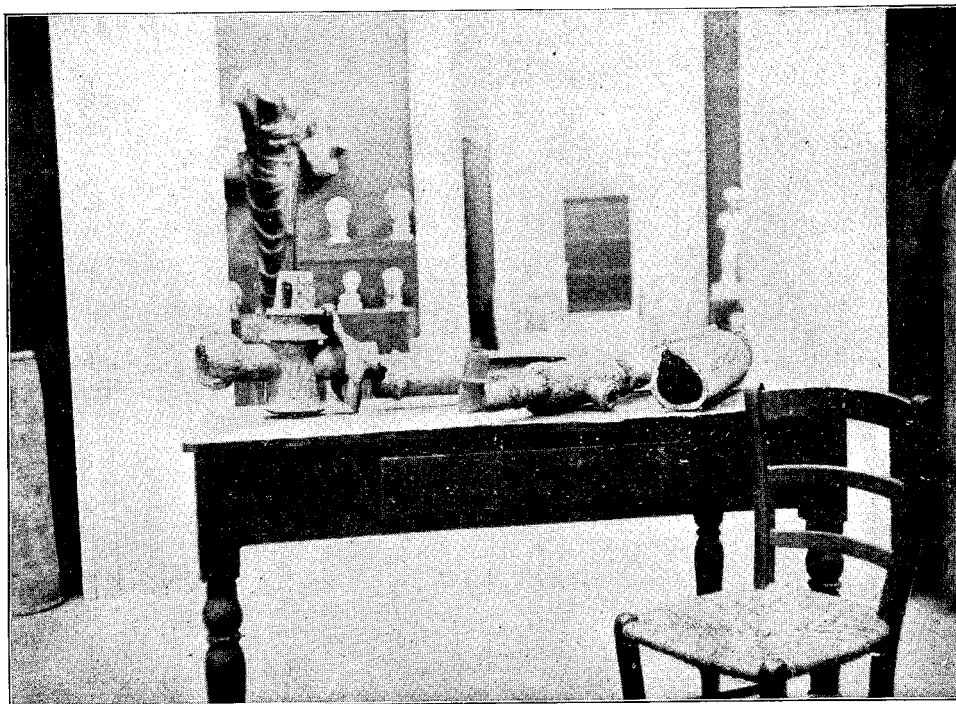
¹ For wooden and stone water-pipe in Rome, see Middleton, ii. 327; and Lanciani's *Frontino*. The figure on p. 190 shows stone water-pipe.

² From a photograph taken by the author.

³ Lanciani, *Frontino*, 414.

sidewalk, in the angle formed by the sidewalk and the houses, and are run under the steps leading to the houses.

Methods of hydraulic construction are very different in countries that need not provide at all or only partially against frost, from what they are in northern latitudes. The winters of Southern Italy make possible in Naples and in Rome what would be impossible in many other cities and countries.



THREE-INCH PLUG-COCK, BRONZE-PIPE ELBOW AND T, AND LEAD PIPE.¹

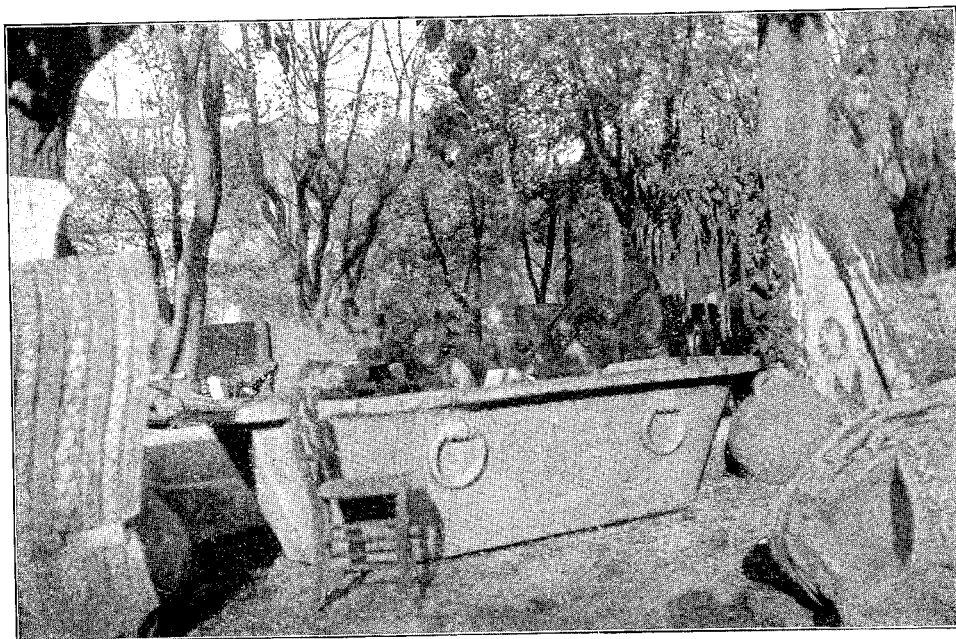
Four-way branches, brass stop-cocks, wipe joints, bronze bath-tubs as well as marble ones, in short, all the essentials of the outfit of a modern plumber's shop, have been recovered in large quantities, and may be seen in the museums of Rome and of Naples. And then to talk of the Romans as not having known that water rises in one leg of an inverted siphon when water is poured into the other!

In Chapter 76, at mention of Caelius Rufus we get another one of those glimpses of life in ancient Rome and of its actors, given by

¹ Magazzino Archeologico at Rome. From a photograph taken by the author.

Frontinus, that might readily make the starting-point for extended study, or for a book, if one wished.

This Caelius Rufus¹ was a typical Roman character of his age, though his short but brilliant life extended only from 85 to 48 B. C. The pupil of Cicero; the lover of Clodia, who in turn was the beloved of the poet Catullus and the subject, the Lesbia, of many of his verses;



MARBLE BATH-TUB.²

defended by Cicero in one of his most famous speeches, *Pro Caelio*,—this one name brings to our mind an array of noted personages and their doings, that is sufficient to cause the dead times of those

¹ Tyrell and Purser, *The Correspondence of Cicero*, iii. 38.

Boissier, *Cicéron et ses Amis*, contains a humanely written chapter on Caelius. Boissier fully appreciates that it is as mistaken a process to attempt to judge of either the defendant or the plaintiff from the plea of the lawyer of either side when made in ancient times, as it would be to attempt to form such a judgment from a similar plea made to-day. Yet many a writer is constantly doing this very thing, and on all sorts of subjects. What is the warning that Cicero gives on this point (*Pro Cluent.* 50)? "It is a mistake to suppose," says he, "that our orations contain our personal opinions; they are the language of the case and of the circumstances, and not that of the man and of the orator."

Drumann, *Geschichte d. Röm. Repub. im Untergange*.

² In the garden of the Magazzino Archeologico at Rome. From a photograph taken by the author. Many other and finer specimens are in the Vatican.

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