

deducting it from what the pipe should contain when clean, the remainder giving the loss.

This naturally affects injuriously the discharge. The following Table, No. 1 taken from volume 65, page 333, minutes of proceedings of the Institute, gives the percentage of space occupied by rust, and Table 2 gives the discharge from corroded pipes. This is very marked in small pipes of 3 or 4 inches. The following instance is given on pages 333 and 334, volume 65. "The water in a corroded pipe, three inches in diameter,



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registered by gauge a head of 77 feet, and through a two inch outlet, the discharge was only 16 gallons per minute; while after cleaning, the pipe registered a head of 82 feet, and a discharge of 150 gallons per minute or nearly 9½ times as much." It is now recognised as a mistake to lay down 3-inch mains. The American practice is not to lay down any mains smaller than six inches.

TABLE 1.

No.	Age of Pipe.	Internal Diameter of Pipe.	Amount of Rust per Lineal Yard.	Capacity of Clean Pipe per Lineal Yd.	% of Space occupied by Rust
	years	inches	cubic in.	cubic in.	
1	20	3	63.84	254.44	25.0
2	29	3	86.94	254.44	34.1
3	38	3	110.44	254.44	43.4
4	29	4	182.37	452.37	40.3
5	22	4	244.37	452.37	54.0
6	14	5	180.00	706.86	25.4
7	15	7	190.00	1385.42	13.7
8	15	10	240.00	2827.44	8.4
9	40	15	1320.00	6361.74	20.7

TABLE 2.

No.	Size of Pipe.	Age of Pipe.	Head Before Cleaning	Head After Cleaning	Discharge per min. before cleaning.	Discharge per min. after cleaning.
	inches	years	feet	feet	gallons	gallons
1	3	29	42	47	47	143
2	3	29	54	56	79	188
3	3	29	70	74	143	260
4	3	32	77	82	16	150
5	3	32	72	72	115	187
6	3	26	56	62	35	220
7	3	26	36	43	65	130
8	4	29	40	45	69	115
9	4	29	38	42	107	125

The strength of corroded pipes which have been laid 20 years is a little more than one half that of new pipes, as tested by breaking weight applied at the centre. This is no doubt the cause of many bursts in mains that have been laid for many years, which, on being taken up or bared where a leakage is located, often snap in pieces. Probably more than three-fourths of the total waste of



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water is due to defective service pipes, unsuspected by an inspector because it may occur on a disused pipe.

In an article entitled "Some causes of failure in service mains and pipes," Mr. John Shaw, C.E., says that the same water will have no effect on one particular part of the main while it attacks another: and further that "The ordinary rusting of iron depends on something more than exposure to an atmosphere containing oxygen. The presence of other substances, notably ammonia and carbonic acid gas, seems also necessary and under certain circumstances, this action is intensified. Iron placed in warm water in a warm position, and carbonic acid gas introduced, is speedily attacked; so that a small quantity of carbonic acid gas will rust any amount of iron.

This process goes on in water mains which leave reservoirs, charged with carbonic acid and free oxygen, travelling swiftly under pressure. When the pressure is reduced the gases rise to the top of the main and are attracted by it; or, it may be the pipes are laid shallow, so in summer the water is heated and the gases being less soluble in hot than in cold water, they are given off and similarly attracted and the conversion of the iron of the main into ferrous carbonate is commenced. Coating with Angus Smith's solution does not always protect the main; this composition being soluble with some waters when they attain a temperature over 55° F."

These remarks open up the interesting question, viz., whether the mains (the incrustations of which are here shown) on the bridge over the Hutt River are more corroded than those laid beneath the surface of the ground, as during the hot weather there is no doubt the pipes get very much heated on the bridges. Another interesting enquiry would be to ascertain whether the pipes supplied from the Karori Reservoir are more, or less, corroded than those from Wainui-o-mata.

The next article on this subject will touch on what has been done in the past in England in the matter of scraping of the pipes, and describing somewhat fully the course followed at Kendal.

The Hon Mrs Assheton Harbord, who within three days, has twice crossed the Channel in a balloon (says "M A P") is a colonial, and hails from Melbourne, Australia. She was a Mrs Arthur Blackwood, and is one of the rare examples of a rich Australian widow who has found a husband in the "Cold Country," as the Australians are pleased to designate England. She married Captain Assheton Harbord two years ago, so is a sister-in-law to Lord Suffield, who, in his younger days, almost held a record for fearlessness. Mrs Harbord upholds all the traditions of the Suffield family, and never seems to be thoroughly happy in her pleasures unless they are accompanied by risk. After having tasted the exhilarations of the air, the earth retains very little attraction for her. The fascination of being above the clouds has made an indelible impression on the mind of the plucky Australian. "I never saw such a magnificent scene as the sunrise," she says. "It was a fascinating spectacle, which I shall never forget." The time occupied in crossing the Channel on the first occasion was 55 min. The balloon trailed through the water, and passed through snow and hail storms, but the plucky occupant of the car showed no sign of fear. Mrs Harbord's example will probably be largely followed during the summer

There still lives in London one, Thomas Atkinson, who helped to build the Rocket George Stevenson's world-famed locomotive. He was born in Northumberland in June 1811, being now 96 years old. At the age of thirteen he began as an apprentice to George Stevenson at his workshops. In 1831 he joined the Newcastle branch of the Old Mechanics, and so has been a trade unionist for over 75 years. He is known as the "father" of the Amalgamated Society of Engineers, and still has in his possession the indentures signed by George Stevenson. The Morning Leader says that a big benefit is shortly to be given to this time-worn "veteran of industry."

Edison at Threescore.

MR. THOS. A. EDISON is just sixty years old, but instead of taking chloroform, according to the Oslerian theory that a man's life ends at three-score years, the famous inventor (we gather from the New York Tribune) has lately announced that he is going to start afresh in a new field of scientific endeavour. For the last forty years Mr. Edison has devoted his energies almost wholly to the perfection of inventions which he believed "could be made to pay," and which in some instances have met with such success that they have revolutionised many phases of modern life, have brought the inventor fame and riches, and have added so greatly to the wealth of the whole world that at the present time there are 250,000 persons in various countries employed in industries which he has founded.

FUTURE PLANS.

In the future Mr. Edison proposes to work untrammelled by commercial fetters. He hopes to solve many a scientific problem vitally associated with human life, even though his discovery may not be a money-making scheme:

"For many years I have longed to take up purely scientific investigation," said Mr. Edison, in talking with some friends on his sixtieth birthday, "but there have been so many things to engross my attention that I have had to defer this kind of work. For years, however, I have been making preparations for this task. I have kept notes of curious things which I have observed in my various experiments, but which at the time were only side-issues.

These side vistas into the realms of science have so charmed me, that now I intend to retrace my steps and strike out in search of the truths I know must lie somewhere beyond my former horizon."

By means of investigations based on the data of his note-books and scrap-books, he hopes to throw light on many subjects which now appear to him as dark mysteries.

A SUPREME INTELLIGENCE.

When the inventor was asked if his theories of evolution and cellular adjustment made him a disbeliever in the Supreme Being, he replied:—

"Not at all. No person can be brought in close contact with the mysteries of nature or make a study of chemistry, or of the laws of growth, without being convinced that behind it all there is a supreme intelligence. I do not mean to say a supreme law, for that implies no consciousness, but a supreme mind operating through unchangeable laws. I am convinced of that, and I think that I could—perhaps I may some time—demonstrate the existence of such an intelligence through the operation of these mysterious laws with the certainty of a demonstration in mathematics."

Mr. Edison's year has been crowded with labour. For the last forty he has worked on an average sixteen hours a day, so that, judged by the eight-hour day, he has already lived a century.

Two Jerry Builders.

Once upon a time there were two builders, each of whom built a row of houses in a certain town. One stormy night just after the houses had been completed, all those of Builder No. 1 were blown down. The houses of Builder No. 2 withstood the gale. Builder No. 1 could not understand why his property should suffer and his rival's be spared. On putting the question to the latter, he received this reply: "Well my boy, you see my houses were papered."