THE DRIVE WELL IN NEW YORK CITY.

It is only within a comparatively recent period that manufacturers and others using large amounts of water in their business have learned how costly that fluid is in some of our principal cities, and especially in New York. According to the city charter, the large users of water from the city mains, such as hotels, factories, breweries, and in fact business establishments of every kind,are now compelled to put in water meters, so that the quantity they consume may be accurately determined, and the amount they must pay be regulated thereby. The law requiring this remained for a long time almost a dead letter, on account of differences of opinion as to what form of water meter was the best, but during the last year or two the Commissioner of Public Works has been energetically pushing forward the introduction of a meter chosen by that department, and therewith has come a great change in the size of almost everybody's bills. Heretofore the amount of the water tax for different establishments had been fixed upon estimates of the quantity required, but now the water used must be paid for according to the registers of the water meters, which make the cost in some cases a hundred fold greater than it was under the old system. There are many instances where this charge upon manufacturers has amounted to as much as $5,000 a year, and in other cases the tax for the water used, measured by the meters, would have been fully equal to $15,000 to $20,000 a year.

On many grounds it is a great advantage to manufacturers of different kinds to be located in large cities, and the industrial interests of New York City, aside from those directly connected with its imports and exports, have been principally instrumental in drawing together the large populations now dwelling on Manhattan Island and the immediate suburbs on the North and East Rivers. Here the workmen can be found in sufficient numbers, in any and all trades, to give the employer an opportunity to select his hands, or to put on extra help at any time; here also we have the first market for many kinds of raw material and the largest market in the country for all kinds, both domestic and foreign, as well as the best point for the sale of the goods. Against these advantages, however, city producers have to pay much higher rents and heavier taxes than those located in rural districts, and, before the enforcement of this enormous water tax was effected, the competition with manufacturers in other places was in many cases a very close one. It would seem that the city should be more liberal in such matters, with a view to encouraging the growth of diversified manufacturing industries here, but the Department of Public Works find that the consumption of water is increasing so rapidly that it will soon, at the present rate, overtake the possible supply from the reservoirs now built, to enlarge which will entail heavy expense. It is also true that where there is not a strict accountability, large quantities of water are allowed to run to waste. From both these considerations the city authorities appear to be determined to adhere to their present scale of charges, a course which is leading many to adopt the driven well as a source of water supply. Its use has already become extensive in this city, and not only here, but all over the country, this mode of obtaining water is now being resorted to more than ever before.

With the different patents covering this method of water supply we do not now propose to speak. There are 150 patents on what is called the "point," or the bottom piece at the lower end of the tubing, into which the water first enters from the ground; as the result of the work of so many minds it would naturally be expected that something tolerably near perfection had been obtained, and it seems as though the one now generally being put down in New York meets all the requirements for such work. It is of heavy galvanized iron, about two and a half feet long, with small holes at regular distances on several sides, these holes being in hollows of the iron made by a sort of ribbed work, and around the whole of this part of the point is a fine brass sieve or netting. The room for the water to flow in here at the starting point, at the bottom of the well, is many times the capacity of the tube above, and the openings are so well protected that it must be very difficult, and is said to be impossible, for anything to get in the pipes which would prevent the regular flow of the water. Tubes with two inches inside diameter are very largely used, the tubes being generally made of wrought iron. The amount of water which one well will afford varies widely, as high as forty gallons per minute having been obtained in some places, and as low as ten gallons a minute in other localities. There is an abundance of water to be had over a large section of Manhattan Island at a distance of from thirty to eighty feet below the surface. The quality of the water obtained varies in different places, but it is generally only necessary to go low enough to get clear, pure water, for, by this system of making a well, the tube may be driven entirely through one stratum of earth furnishing an inferior quality of water, until a different stratum is reached which will give water as pure as desired, when the supply is drawn only from the latter source. As this water, however, has the general properties of nearly all well water, it is not always the best kind to use in steam boilers, and where it is so used, a chemical composition should be added to prevent the injurious effects which have been experienced from its continued use for this purpose.

The cost of these wells, as they are covered by patents, is fixed according to the supply of water required, on the principle that the wells shall be put down for the amount which one year's supply of water would cost from the city *i.e.*, the city's charges are based on the general rate of two cents for one hundred gallons—then fora manufacturer requiring 6,000 gallons a day, the cost of Croton water, counting 300 working days in a year, would amount to $360, and for this sum, or a little less than that proportionately where the supply needed is very large, one or more wells are put down sufficient to give the required quantity. So far there have been but few instances of any trouble in obtaining a regular supply after the wells have once been properly put down, and many wells and gangs of wells have now been in operation eight years, with no apparent change in the flow or the quality of the water.

FERDINAND DE LESSEPS AND THE CHAGRES CANAL.

The Viscount Ferdinand de Lesseps, with his family and staff of engineers, arrived in this city Feb. 25, from Panama, where he had been to examine the route of the proposed Chagres Canal.

Born in Versailles, France, Nov. 19, 1805, M. de Lesseps early entered the diplomatic service of his country, continuing therein some forty years. In 1854, he went to Egypt on the invitation of the Viceroy, Said Pasha, to examine the project for a ship canal across the Isthmus of Suez, and two years later he published a memorial giving full details of the enterprise. A stock company for the construction of the canal was formed, and M. de Lesseps gave himself up entirely to the prosecution of the great undertaking. The work was begun in 1859, and completed in 1869. This great achievement, conceived and carried out in spite of gigantic physical, financial, and political difficulties and discouragements, gave M. de Lesseps undisputed rank as the first engineer of the age.

Since the completion of the Suez Canal M. de Lessepshas suggested or has been consulted with regard to several great geographical and speculative enterprises—among them the conversion of a large area of the Sahara desert into an inland sea; the cutting of a ship canal through the Isthmus of Corinth, which is now being excavated; and the laying out of an elaborate scheme of Russian railways connecting the south and east of Europe with India. All these projects, however, are of comparatively small importance beside that of severing the Isthmus of Panama by means of a salt water ship canal at sea level.

With the history of this enterprise, since the Canal Congress in Paris last spring, the readers of the SCIENTIFIC AMERICAN are already familiar. M. de Lesseps says that as early as 1869 he was convinced that a sea-level canal without locks was the only one practically possible for the Isthmus; and at a public meeting in Paris, in 1870, he confidently asserted that opinion. This, however, it is proper to remember, was purely a matter of theory, for at that time there had been no careful survey of a route for a canal without locks, and accurate estimates of the practicability or probable cost of such a work were out of the question.

Having gone to the Isthmus determined to demonstrate the wisdom of his choice, M. de Lesseps has naturally succeeded in finding confirmation of the justness of his *à priori* belief.

The proposed canal substantially follows the route of the Panama railroad. A tide-lock is to be constructed in the Bay of Panama to control the level of the canal. In the Bay of Limon, on the Atlantic side, it is necessary to construct a breakwater two kilometers long, on account of storms. The cost of the entire work, estimated at 843,000,000 francs, includes the following items: All excavations, dredging, and removal of earth, 570,000,000 francs; dam at Gamboa, 100,000,000 francs; changing the waters of the Chagres, Obispo, and Trinidad, 75,000,000 francs; tide-lock on the Pacific, 12,000,000 francs, and breakwater on the Atlantic coast, 10,000,000 francs. Contingencies are estimated at 76,000,000 francs. The work will take eight years to complete, and it may be commenced before next June. The estimates contemplate the removal of 75,000,000 square meters of rock and soil.

The Gamboa dam will be required to form an artificial lake to receive and regulate the flow of the waters of the three rivers, whose periodical floods furnish the most serious danger to the proposed canal. This dam will be 5,000 feet long and 40 meters high. It will be exceeded in size only by the three great dams at St. Etienne, France, La Gemappe, Belgium, and Alicante, Spain. The last has stood for three hundred years.

At a reception given to M. de Lesseps by the American Society of Civil Engineers, Feb. 26, the distinguished engineer insisted that the proposed Chagres Canal was a much less difficult task than the canal at Suez. The deepest cutting would have to be about the height of the Brooklyn bridge towers. One of the visiting engineers, M. Douzat, said there would be seven miles of deep cutting, averaging 180 feet, of which 160 was rocks. The deepest cutting in other parts of the canal would average 40 to 45 feet. The entire length of the canal is about 45 miles. In answer to the question why a sea-level canal was preferred to one with locks, M. de Lesseps said:

"If the Commission of Engineers which had gone down to Panama had reported in favor of a canal with locks, I should have put on my hat and left the whole project and would have had nothing to do with it. That plan will do for small ships, but when we have vessels now afloat 500 feet long, and others on the stocks 600 feet long, it is impossible to say for what you would have to build locks. Single locks would be slow, and double locks, though quicker, would be very expensive and require constant repairs. At Nicaragua they intended the use of locks, and with the earthquakes which prevail there the repairs would be ruinously expensive, and even at Panama, where earthquakes do not exist, they would be fatal by reason of the loss of time. I would not have anything to do with a locked canal except for little ships. It is not the proper idea for a grand interoceanic canal."

M. de Lesseps is a man of medium height, strongly built, alert in all his movements, erect and elastic in carriage, and seemingly not much over fifty years of age, though really seventy-four. His first days in New York have been devoted to the inspection of the elevated railways, the Brooklyn Bridge, the working of the fire department and the Croton water service.

Loiseau Compressed Fuel.

At the last session of the American Institute of Mining Engineers, held in this city, a paper was read by E. F. Loiseau on "The Successful Manufacture of Pressed Fuel at Port Richmond, Philadelphia." A huge fire in the grate gave evidence of the qualities of this fuel, specimens of which in egg-shaped lumps were examined with interest. The fire was started without the use of kindling wood. The paper explained the process of manufacture, the difficulties encountered, and the measures adopted to obviate them. The elements of this fuel are 91 per cent of coal dust and 9 per cent of pitch, the latter being used to cement the coal dust.

The fuel lasts as long as ordinary anthracite, and does not produce clinkers. Thirteen tons of it are now produced each hour. Reference was made to the difficulty of obtaining a supply of coal dust, as the coal men were not inclined to supply the means of making a fuel to compete with coal. But confidence was expressed that it would soon appear to the advantage of coal men to erect machines for the manufacture of the pressed fuel and make it a leading industry.—*Coal Trade Journal.*

[We have used Mr. Loiseau's pressed fuel in an open grate at our residence, and can add our testimony as to its cleanliness, heat giving and lasting qualities.—ED.]

Land Slide in Fraser River.

A notable disaster occurred in the fore part of February at a place called Maple Ridge, some twelve miles above New Westminster, British Columbia. At that point the Fraser River is a quarter of a mile wide; the south bank about ten feet high, the north bank rising to a bluff of over a hundred feet. Suddenly one afternoon some acres of the highest part of the bluff slid into the river, where it was about fifty feet deep. The breadth of the river was reduced a half, and the rush of earth threw up a wave which flooded for miles the level country opposite the bluff, doing much damage. The river at the place where the land slide occurred presents a strange appearance. Rising from two to ten feet above the surface of the water are trees standing at different angles, some of them as straight as when they stood on the high bank, and others leaning and partly covered with earth. The tract that went into the river was in shape like a half moon. The new bank reveals reddish, light earth for about twelve feet from the top, under which is a stratum of blue clay some twenty feet thick, and all the earth below that, so far as it is visible, is a mixture of coarse gravel and sand. There are large cracks along the bank, extending inland for 150 feet or more. The impression is that still more of the bank will go into the river.

Leading American Industries.

Already more than thirty of our largest manufacturing establishments, illustrating as many different industries, have been published in these columns during the past year. Our artists are now engaged preparing full page engravings, of several other manufacturing works, which will appear in forthcoming issues. It is our purpose to continue the publication of this series of mechanical subjects until every leading industry of the country has been illustrated and described. This feature of the paper has proved very acceptable to our readers and gained for it many new patrons.

New subscribers and others desiring copies of any of the thirty three numbers containing full page illustrations of as many different manufacturing establishments, can be supplied by addressing this office. Price 10 cents a copy by mail.

Snow Eating Unhealthy.

A writer in the *Phrenological Journal* admonishes parents to guard their children from the practice of snow eating, claiming that it has much to do with head colds of many girls and boys, because of the chilling effect of snow upon the palate or thin partition between the mouth and nostrils producing congestion in the fine membrane which lines its upper surface. As this membrane is almost entirely constituted of delicate nerves and blood vessels, inflammation is likely to follow the congestion, and perhaps degenerating into nasal catarrh, an affection so common with persons in our northern latitude.

Back Numbers and Volumes.

Subscribers to the SCIENTIFIC AMERICAN will be entered on our books to commence at the date the order is received: but those desiring the back numbers to the commencement of the year will be supplied on their signifying a wish to have them. Last year's volumes may be had in sheets by mail at regular subscription price, namely, $3.20.