Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ Messrs. Trubner & Co., 60 Paternoster Row London, are also Agents for the SCIENTIFIC AMERICAN.

☞ "The American News Company," Agents, 121 Nassau street, New York

☞ "The New York News Company," 8 Spruce street.

☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London, England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

VOL. XVIII., No. 8....[NEW SERIES.].... *Twenty-third Year.*

NEW YORK, SATURDAY, FEBRUARY 22, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

CONCERNING STREET CARS.

Certain London capitalists, whom we might almost designate philanthropists, having at heart a desire for benefiting the masses, and at the same time being wise enough to foresee in the project a paying investment, are endeavoring to introduce our popular democratic and American institution, horse cars, into the English metropolis. For two successive sessions have these individuals petitioned Parliament for powers to carry their project into effect, but without having their prayer answered. Yet with a commendable pertinacity again have they published, according to law, the prescribed notices of their intention to once more apply for a bill, in the session of 1868. There is a certain proverb which assures success for the third trial, and if there is any trace of truth in this popular notion, the petitioners will this time come off triumphant.

If tested by the greatest amount of service rendered to the largest number of the community, the street cars in this country may be regarded as one of the greatest among public benefits, their general use upon the principal thoroughfares of all our large cities affording proof sufficient that they fill a wide-spread public demand. But these railways, it must be admitted, are not without their disadvantages, the presence of the "permanent way," as the English style it, proving a constant and considerable impediment to general traffic. It is needless to expatiate on the difficulty which ordinary vehicles experience in crossing and recrossing the tracks, our only purpose now being to give some suggestions relative to obviating this really serious annoyance. If rails could be entirely dispensed with except when actually in use, a great desideratum would be attained, but up to this time cars which are constructed to lay and take up their own tracks, of which there are many styles, all theoretically perfect and working well as models simply, have signally failed in actual practice. If then we must tolerate the iron rails in our streets, what form is least objectionable?

The London company before referred to propose to lay down a crescent rail which will be on a level with the street both on its outer side and between the rails, the only break in the surface being a groove on the inner side of the rail for the flange on the car wheels, such groove being too narrow to take in the tire of any ordinary street vehicle. By employing this rail, the company contend that the level of the street will not be broken nor the passage in any direction by ordinary carts and carriages obstructed, the whole width of the road being preserved for continued public use. Such a rail could never be used in this country for the groove would be continually choked up, in summer with dust and street waste, in winter by the more formidable snow and ice, and it seems hardly possible that the track would prove a success in England.

In our last issue we gave, on the authority of a newspaper correspondent, a short notice of the style of track adopted in the streets of Paris. The rails are simple metal plates spiked down, while the wheels running on them are without flanges. The cars are made to keep on the plates by means of a fifth wheel, which has a flange but half an inch thick, a mere disk, running in a grooved central rail, laid for the purpose. This extra wheel, being attached to the car by a lever, is to be raised at will and the car run off the track, a feature of the plan, we may remark, whose desirability is not so apparent, a short turnout being a preferable method of allowing cars to be run in both directions with but one track. The Paris plan, however, certainly embodies several and important advantages. Ordinary vehicles can in no way be inconvenienced, but on the other hand the permanent way may be of positive service. The same objection, however, can be urged against the central as well as all other grooved rails.

Now a simple modification of this Parisian idea, it seems to us, would furnish a track, if not perfect, yet a decided improvement upon any plan that has ever fallen under our notice. Let two extra wheels be provided, one at the front, the other at the rear of the car, both running on a central rail. The latter is merely a continuous iron bar slightly raised above the street level, the wheels themselves being grooved or made with double flanges. The advantages of such a method are too apparent to need particular mention, and if our street railways were laid out accordingly, the objections now existing, and which prevent the laying of tracks in some thoroughfares, we are confident would no longer exist.

GATHERING, DISTRIBUTION, AND UTILIZATION OF SEWERAGE.

The usual method employed in our cities of discharging the accumulations gathered at our water closets directly into street sewers, is not only wasteful but more or less injurious to health, the exhalations from fermentation and decomposition finding their way back to our dwellings and tainting the atmosphere we breathe, notwithstanding the precautions taken by means of gas traps and other similar contrivances.

The same objection will apply to the attempt to carry off the excretæ by a flow of water; the solid and liquid portions will be removed, while the gaseous components pass back, by their ascencive force, to the rooms.

Another system has been devised by Capt. Chas. T. Liernur, of London, from whom we have received a description with diagrams, which latter, however, we do not think are necessary to arrive at a correct notion of the nature of the invention. It is in use at the Hague, the capital of Holland, and has proved highly efficient. The plan is to connect the pipes leading from the rooms to air-tight reservoirs of boiler iron situated under the street crossings and of capacity sufficient to receive all the excrements which may accumulate during one, two or more days, as desired. These pipes are at least five inches in diameter and are provided with valves which may be operated from the sidewalk. The pipes are, of course, air-tight. Tho privies have each a pipe leading to the delivery pipe, and in case of one water closet being above the other, drooping lips inside the pipe compel the filth to follow the middle of the pipe, so that there may be no adhesion of the matter to its sides. From this delivery pipe one is carried up above the roof of the building acting as a chimney to carry off the effluvia to the upper atmosphere. The receiving pipe has a short upward curve just before it reaches the street reservoir, which receives the excrementitious matter until it is ready to be taken away.

Every night, or as often as may be necessary, a movable air pump driven by steam is brought to one of the reservoirs, a flexible hose is placed over the reservoir and connected by a coupling, when the air is pumped from the tank, the sidewalk valves being shut, and the contents of the pipe and tank are emptied by atmospheric pressure, or suction, into a movable tank accompanying the steam engine and pump. As soon as the vacuum has reached the proper point, indicated by a gage, the valve communication between pipe and tank being opened, the filth rushes into the tank, the air pump being kept in operation during the process, and thus aiding in effectually cleaning the pipes even to their upward openings, and compelling even the gases to accompany or follow the solid constituents. After being collected, the contents of the tanks are carried to some point outside the town where they are barreled and sent to the country. Capt. Lienur's plan comprehends, also, the method of application of the manure to lands, a subject which we reserve for another notice.

PROCESS OF SUGAR MAKING IN MAURITIUS.

There is no department of manufacturing industry in which more progress has been made during the last ten years than in the production of sugar. It is equally true that there is none in which so much remains to be done. The extraction of white sugar direct from the juice of the cane and beet, without refining, is now an accomplished fact. At the great Exposition in Paris, beautiful specimens from three estates in Mauritius were exhibited and took gold medals. Our Paris correspondent took pains to obtain specimens, which may be seen by application at our office, and every person interested in the subject of sugar will do well to call and examine these beautiful samples, produced without the use of a particle of bone black, and without the addition of any injurious chemical substance.

M. Pou in, one of the three enterprizing planters who received the gold medal as before stated, gives the following simple statement of the process employed:—

"The canes are crushed in very powerful steam mills, the cylinders of which turn extremely slowly, so as to squeeze out all the juice. The juice is received in troughs and a certain quantity of sulphite of soda (neutral and anhydrous, *i. e.* without water) is added to it. After this first operation, the object of which is to prevent the juice from fermenting in the defecating troughs, it is saturated with lime (the quantity varying according to the quality of the juice), and it is then drawn off into an apparatus called an '*appareil à triple effet*,' which is a set of vacuum pans three in number. It is then boiled at a very low temperature in these vacuum pans. When the sirup is concentrated to the granulating point, it is left to cool. When cold it is put into a turbine or centrifugal, which is made to perform 700 revolutions per minute. The sugar is 'clairced,' or clarified, by having thrown upon it a 'claire,' *i. e.* a sirup, which is ladled out of a jar or tub and thrown upon the revolving mass of sugar by a workman.

"The claire is simply a sirup of sugar, or molasses, into which has been previously introduced a certain quantity of water, so as to reduce the sirup to a density of 35 degrees (Baumè's aerometer, called also a *pèse syrop*). As the workman pours in the claire the sugar becomes white, and when the cleansing process is thus accomplished a jet of dry steam is let into the turbine. This jet is sent directly into the center of the turbine.

"A jar or tub for the claircing or clarifying sirup is attached to each turbine and bears a fixed proportion to its capacity. The workman pours this sirup upon the revolving sugar with a large iron ladle, about three-fourths pint; so that the contents of the turbine are clarified by a single jet of the sirup, and in from three to four minutes. The sirup usually employed in turbining the sugar is obtained from that part of it which flows from the turbine.

"In Mauritius the sirups from the turbine are usually reboiled a second and third time, so as to extract from them every particle of crystallizable sugar. The residuum of the third boiling is generally sent to the distillery and used for making rum.

"By means of this process canes cut in the morning may furnish sugar perfectly ready for packing and shipping by evening of the same day. But for the full practical understanding of all the niceties of the process, a visit to the Mauritius might be useful, for much depends on practice. For instance, the success of the claircing in the turbine depends in a great degree on the skill of the workman in charge of the ladle; and this skill is the result of practice and observation. So also in regard to the jet of steam sent into the turbine, and *which must be dry, i. e.*, heated to a degree where it ceases to be moist, as moist steam would cause the sugar to melt in the turbine, instead of drying, as happened in the beginning in Mauritius, where the planters began by using condensed steam, which is very bad.

"The very large and splendid crystals shown in some of the samples are easily obtained; but they cost more and are inconveniently slow in melting. Those samples in the Exposition were made simply to show what can be done; but they would be unsuitable for general use, as they would take a good half hour to melt in water.

"Let anyone desirous of ascertaining the relative qualities of European-made and Mauritian-made sugars, dissolve the latter in a glass of water and observe its delightful perfume. But in order to have this fine odor, the sugar must not have undergone fermentation, nor have been subjected to refining by bone black. All the Mauritian sugars made by this process have this perfume, and all are, strictly speaking, raw sugars, *i. e.*, they are purified by a mode of fabrication from the juice, which is not refining, and which makes no change in their natural savor.

"The Mauritian sugars are only admitted into France under the specification of "assimilated sugars," in order that they may be made to pay the same duties as "refined sugars." The scale of duties levied here and in England on Mauritian sugars practically excludes them from both markets. This exclusion is kept up simply in the interest of the refiners of both countries. The Mauritian sugars are mainly consumed by India and Australia, which admit them free.

"The flavor of anything made with these Mauritian sugars is said to be superior to that of things made with refined sugar. Preserves made with it are said to keep much longer, and it is considered much more wholesome."

We hope that our Louisiana sugar planters, and the enterprizing men who are preparing to introduce the manufacture of beet sugar into our country, will give these remarkable results of modern science an enlightened consideration.

IRON PUDDLING BY MACHINERY.

A correspondent writing from St. Johns, New Brunswick, on the above subject, says that as a general thing puddlers discourage all attempts to introduce machinery as an aid to the arduous and exhaustive labor to which they are now subjected. But, nevertheless, a number of attempts have been made to that end. "As far back as 1836, a patent was granted to Dr. Charles Schafhæutl of Dudley, England, for an 'improved apparatus to impart a compound motion longitudinally and transversely to the puddling tool.'" This invention was found to be imperfect, but no doubt has started numerous later inventions for the same purpose, among which I may mention Bennett's, Griffith's, Harrison's, and others, all secured in England during the last six years. Bennett's machine is placed on the top of the furnace, a lever through which the motion is imparted to the tool hangs down in front of the fire door. The power is taken from the engine by a long connecting rod, which moves backward and forward, sliding at the same time the lever which holds the tool around a quadrant to impart the side motion. It is rather a difficult matter to describe the machine without drawings, but probably the explanation I have given may enable some to catch at the idea I have endeavored to convey. Mr. Griffith's machine is, I believe, on the same principle. Mr. Harrison has placed a small cylinder, either for steam or water pressure, over the furnace, to furnish the movements for his machine. When started, it works the rubble backward and forward, and around the bottom of the furnace, but whether it is an improvement on the other two patents I have no means of knowing. Bennett's machine is now in operation at his works, and answers a good purpose,—so I heard from a workman last spring. I saw in the Iron Master's Association book of the United States, that Mr. Grove, of Montour Rolling Mills in the State of Pennsylvania, had introduced machine puddling in his works. Perhaps he would be willing to give some information on the subject.

In 1863, a patent was granted to Messrs. Walker & Warren of Wolverhampton, for a rotary puddling furnace. This patent was purchased and experimented upon by the Dowlais