

THE NEW DRAINAGE AND SEWERAGE SYSTEM OF NEW ORLEANS.

BY FREDERICK MOORE, C.E.

New Orleans is undergoing an upheaval. It is in the hands of the purger. The cleansing of its heart and main arteries is about done, and the work on its lesser arteries has just begun.

New Orleans is the last large city to install drainage and sewerage systems, and how it has gotten along to this time without them is a miracle. The installation there, however, embraces some of the most difficult engineering problems in this line that have ever been attempted, and some engineers have said the city could never be drained thoroughly. This has been given as the excuse for its not having been undertaken earlier; but the real reason is that the funds have never before been forthcoming. This work has been greatly assisted by the experience in drainage of other cities, and the installation of the latest pumping machinery, more of which latter enters into the New Orleans system than into that of any others in the world.

In 1894 a board was appointed which drew up plans for a drainage system to cost \$8,000,000. Bonds were issued for a part of this sum, contracts let, and by 1897 work began on the first section, comprising the heart of the city. The yellow fever epidemics of 1897, '98 and '99 were the prime cause of a further bond sale in 1900 of \$12,500,000, in order to complete

slope and Lake Pontchartrain, after a slight rise, is a level swamp. It is out of the question to drain into the river on account of the cost of lifting the great volume of water to such a height, the river at high water being 17 or 18 feet above the lowest point in the city. It follows from these conditions that the capacity of discharge for the drainage canal must be secured by size, not slope, and accordingly some of them at the discharge ends will have a width of 25 feet, a depth of 12 and a cross section of 175 square feet, so as to give the necessary discharge of 1,200 feet per second. It is intended to keep them pumped free of water, so that when a rain storm occurs they will first serve as reservoirs and afterward aqueducts to the pumps.

Under ordinary circumstances they will be empty except for the daily flow from seepage and the contribution waters undefiled by sewage; which under no circumstances, could be relieved by the drainage system. It is possible for the drains in time of drought to go for weeks and even months without being flushed out. In contrast with the immense volume of drainage, the sewage of the entire city is but about 20,000,000 gallons per day,

or 30 cubic feet per second. If this small volume was divided among the several drainage canals, it would just trickle over the sides and remain (in dry weather) at the bottom, to go through the process of oxidation, and generate poisonous and obnoxious gases within the city. To discharge the sewage, like the drainage, into Lake Pontchartrain would pollute that body of water. Consequently an entirely separate system, which will pump the sewage into the river below the city, is essential.

The lowest part of the city is Broad Street, which runs parallel with the Mississippi about three

laterals are, of course, lined and covered, as is also the Broad Street canal within the city proper; for they are under, and their massive brick and concrete walls and steel arches hold up, the streets of the city. The laterals have, at intervals, branches parallel to the river and at right angles with them to intercept the flow of the gutters running back from the river. One of the most apparent defects in the present system (if it can be dignified with that term) is that these gutters extend from the river to the swamps without any increase in dimensions and with a constantly diminishing slope. The new system will break up these long leads by the intercepting branches.

When the drainage is collected into the main canal, though it now drains (the portion that is completed) into Lake Pontchartrain, it will be carried on down below the city and pumped into Bayou Bienvenue, an artificial stream large enough to accommodate small schooners, from which it will flow into Lake Borgne.

Lake Pontchartrain is practically surrounded by land. It has but one narrow outlet into Lake Borgne. Lake Borgne is about treble the distance from the city, and has very few pleasure or summer resorts on its shores, and it is but a vast arm of the Gulf of Mexico.

At times, however, the volume of drainage is so great that its total disposition in this direction is economically impracticable; and as, at such times, from its extreme dilution, the water is practically unobjectionable, the plan contemplates, when the amount is too great for the pumps leading to Lake Borgne to handle, to discharge the surplus at three different points into Lake Pontchartrain. As the main canal is not completed as far as Bayou Bienvenue, the drainage now carried off by the new system is pumped into Lake Pontchartrain.

A central electric power house, with a capacity of 10,200 horse power, and nine pumping stations will be required to operate the drainage system. The power house and three stations have been completed.



One of the Small Pumping Stations Lifting Water Out of the City After a Rainfall.

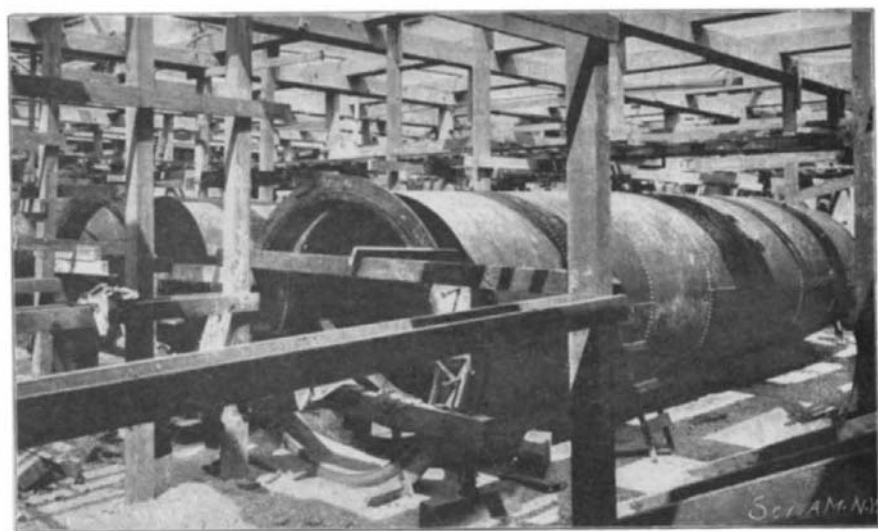


The Old Basin—One of the Open Drainage Canals.

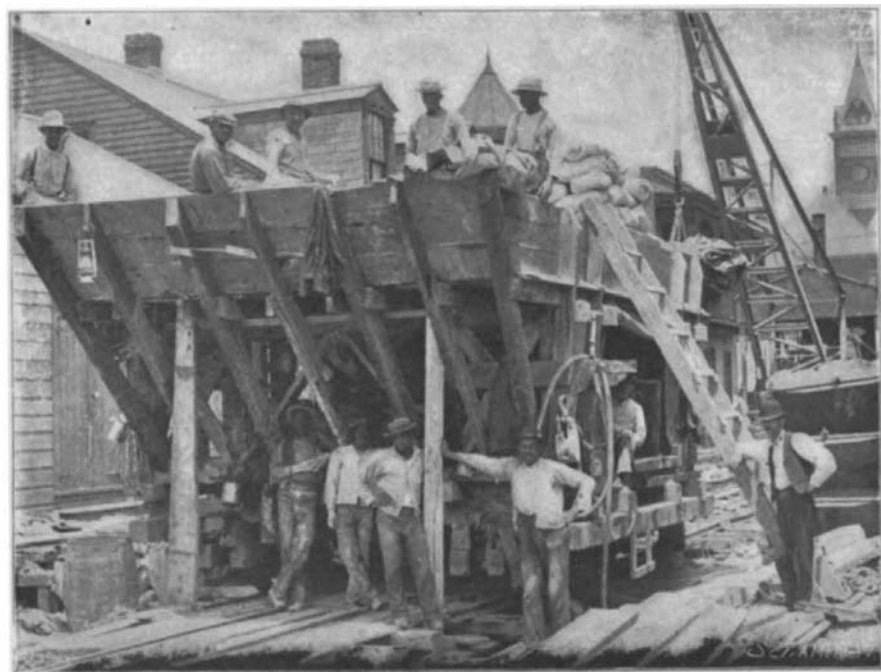
the drainage and install a complete sewerage system.

On July 30 of this year, contracts to the amount of a million dollars were let on the second section, and last week, under these contracts, ground was again broken.

The quantity of drainage to be dealt with in New Orleans is unequalled except, perhaps, in some of the East Indian cities. There is an annual rainfall of 5 or 6 feet, a monthly fall of 15 or 20 inches, a daily fall of 4 or 5, and a fall, for a few minutes, at the rate of 6 inches per hour. The conditions for delivery are still more unfavorable. The city is built on an alluvial plain, six miles in width, lying between the Mississippi River and Lake Pontchartrain. The plain has a slope from the river back of about 15 feet; all of which is consumed in the first three miles and most in the first half mile. Between the foot of this



Some of the Large Drainage Pipes.



One of the Movable Concrete Mixers.

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miles back from it. It is about 15 feet below the river bank on one side, and 5 feet below Metairie Ridge, which runs parallel with it on the edge of the swamps, on the other side. It is about a foot and a half below the level of the Gulf of Mexico. The drainage plans will take advantage of this feature, and collect the drainage into a main canal on Broad Street by a system of laterals on each side. These

The completed stations relieve the city directly, that is they pump from the drains of the city proper into the open canals that lead to Lake Pontchartrain. The other stations will be along the main canal to Bayou Bienvenue. As it is impossible to send the water in one flood to the bayou and then lift it over the levees of the bayou—for the lift would have to be too great and the excavations, to give the canal an adequate flow, too deep—the other stations will be at intervals along the main canal. The water will flow to one and be lifted to flow on to the next, lifted again, and so on to the bayou.

The old drainage system is a series of gutters on the surface of the streets next to the sidewalks. There is so little slope to them that when the heavy rains occur the streets are flooded. Much of the

water is seeped up by the earth. That which gets to the open canals on the broad streets in the rear of the city is lifted by a couple of old-fashioned paddle pumps, or rather swept by them, over the levees of two navigation canals that lead up into the rear of the city from Lake Pontchartrain. The pumps are inadequate for the relief of the city, and the gutters and canals drain only overflow waters. The rest remains in them stagnant until it dries up. It is a tremendous stride from these conditions to what promises to be the finest drainage and sewerage system in the world. The sewerage plans are not yet completed. Expensive tests and experiments are under way. It is expected that the work will be started early next year.

PORTRAITURE BY FLASH LIGHT

The professional photographer has always considered that nature discriminated against him in the distribution of the light which is so essential to him in his business. The season of the year when he is the most rushed with orders is in the winter time, and this is the time when his working day is necessarily very short. Four hours a day is the limit which is available for good work for his purposes, and any attempt to use the studio any longer than this is only done at a sacrifice of quality.

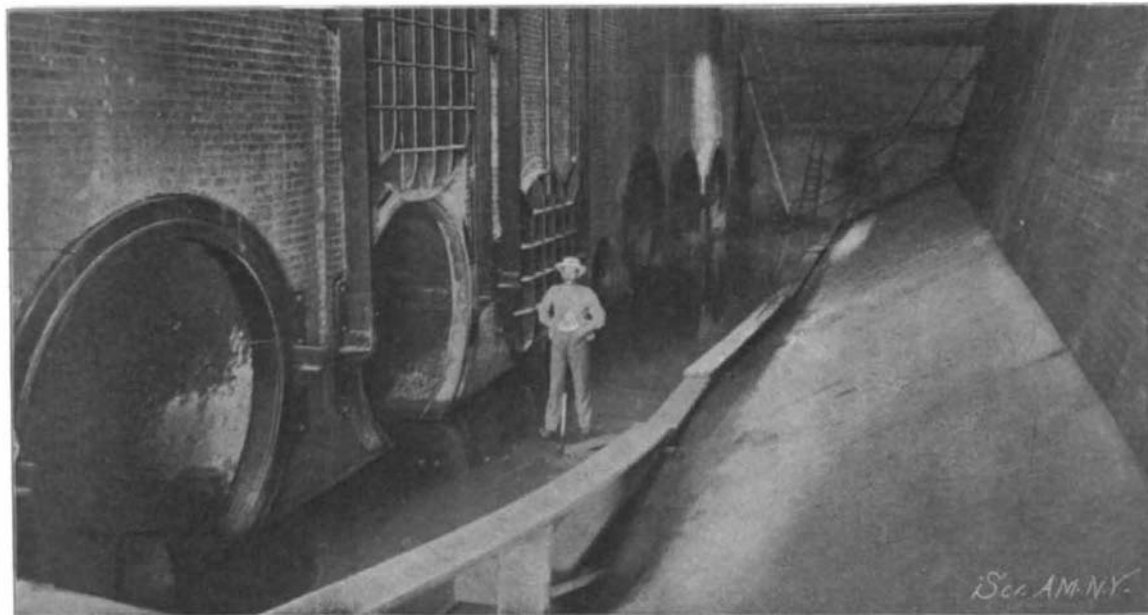
For a great many years it has been thought that the flash light powders would prove a means of extending his working day, but in consequence of the dirt and smoke resulting from the powder in burning the use of the light has been limited. The pictures made in this way are also generally harsh in contrasts. Then again, on account of the smoke, it would be necessary to open all of the windows and doors of the operating room after each exposure, and this, of course, greatly hampered the photographer in the progress of his work and at the same time made the room unfit for occupancy in cold weather.

A means of making use of the flash powder with safety and comfort has been devised by H. B. Shaeffer, of Altoona, Pa., and his system, which is shown in the accompanying cut, is now being introduced into a number of studios for use instead of the skylight. The flash light permits portraiture to be carried on in a ground-floor gallery, which is a luxury not often to be indulged in by the photographer located in the business section of a large city, on account of the value of the ground, and this is considered a great advantage in seeking custom. The greatest merit of this device, however, is the one of prolonging the photographer's day almost indefinitely, for he can take pictures as long and as late as he can get persons to come and sit in front of his camera.

Another notable feature to be considered is the use of such a device in child portraiture. There are some children who are so nervous and restless as to defy the skill of the photographer and the lens maker to get a clear, sharp picture under the skylight, for although the exposure necessary under these conditions is but a second or two, this period is longer than a restless child can be kept

absolutely quiet. A flash-light exposure occupies but the two-hundredth part of a second, which is a little too quick for any youngster.

Mr. Shaeffer's invention consists of a collapsible box, made of a fireproof material, which entirely incloses the flash. On the face toward the sitter, the material is of light weight to permit of the passage



Sub-Surface Suction Pipes at End of One Section of Canal.
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of the light; and in addition to the flashing apparatus, there is also contained in the box a half a dozen incandescent lamps, which alone are sufficient to properly light the model who is being posed before the lens. This enables the operator to see just exactly the effect he will get on the sensitive plate with the flash, and all being in readiness, a squeeze of a bulb in his hands opens the shutter of the camera, and at the same time elevates the flash powder into contact with an alcohol flame, causing the flash. The release of the bulb closes the shutter, thus completing the exposure.

The smoke which arises from the discharge is held captive in the cabinet, but it is disposed of by the operator, who, by a few turns of a wheel drives it out by the revolving fan into the open air through a tube leading to a convenient window. An electric fan can be substituted for the hand-propeller. There is absolutely no smoke or odor, and the room is at once ready for the next exposure. The pictures taken by

Novel Condenser in an Australian Electric Plant.

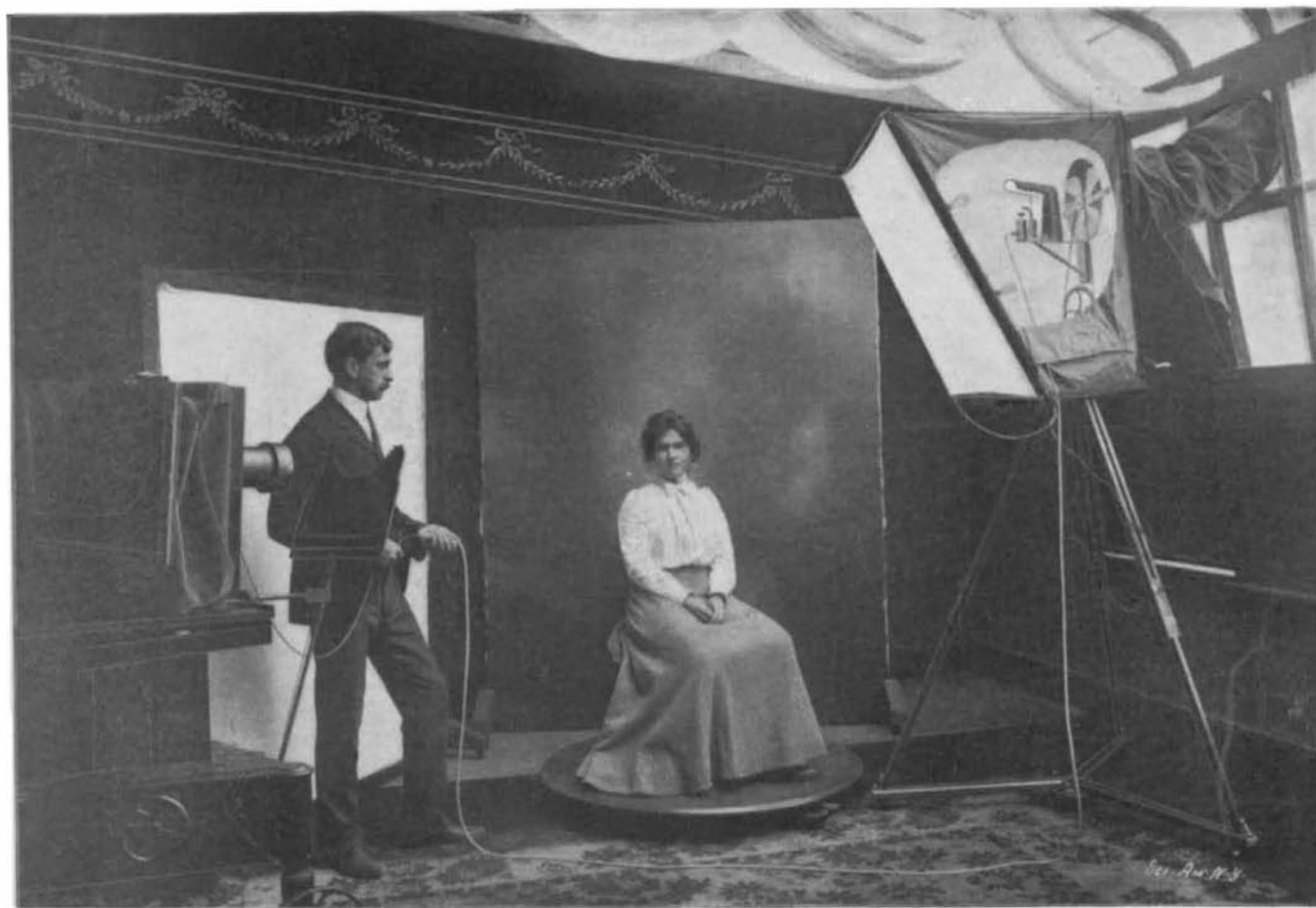
In a paper read before the Société des Ingenieurs Civils, M. Fouché describes a novel form of condenser which is used by a plant in the Kalgoorlie district of West Australia. In this region water is so scarce that it is paid for at the almost incredible rate of \$5 per cubic

meter (39.4 inches), and it is necessary to economize it to the utmost degree. The present arrangement is quite successful in saving practically all of the water of condensation, and it is thus used almost indefinitely. The Kalgoorlie mines, whose annual gold production reaches sixteen millions a year, have been heretofore provided with a number of large engines, but these were generally of the non-condensing type and worked under very unfavorable conditions. Consequently a light and power company was formed in order to furnish energy to the mines at less cost. The first plant of this kind has three vertical compound engines which give a total of 4,500 horse power. The condenser is provided with 27 ventilating fans which

send two million cubic yards of air against the surfaces of condensation. These surfaces are composed of corrugated sheet steel, and the plates are assembled in pairs to form a corrugated flat chamber. The condenser is built up of a series of such hollow plates, which are joined to two conduits, one for the entrance of steam and the other for the water-discharge. The condensation is thus carried out under the best conditions. It is found that the plates do not deteriorate if they are protected from the weather, and the apparatus is easily kept in order. Owing to the hot climate the ventilators had to be made especially large and a great quantity of air be forced against the plates. The steam comes from the engines by a 24-inch pipe and passes first into nine oil-separators, then into the condenser, from which the water is taken by three pumps. An elaborate system of filters is used to render the water fit for use again in the boilers. Even the small amount of water coming from the separators is used, this being passed first through a charcoal filter, then through a sponge-filter. The condenser water, which is nearly pure, is also passed through a charcoal filter. In this way none of the water is wasted. The energy required for the 27 ventilators and 10 pumps is estimated at 120 horse power.

A new screw propeller, for which various advantages are claimed, has been brought out in England, and its merits were discussed at the meeting of the International Congress at Glasgow. Mr. Mumford said that he had experimented for twenty years with screw propellers of various pitches, but had never found one to give higher efficiency than a true screw. Also, that in pro-

PELLER designing, no reliance whatever could be placed upon theory alone; the only course was to obtain better knowledge by actual practical tests; so far as he could see, there was not much hope of improving upon the screws now in use. These opinions are quite in line with those expressed to the writer many years ago by Capt. John Ericsson.



A CONVENIENT FLASH-LIGHT APPARATUS FOR PORTRAITURE.

this process are very soft and harmonious in their lights and shades, equal in appearance to those obtained by daylight.

Oil turpentine is an excellent medium for restoring the gloss to patent leather shoes, and satchels rubbed with it are made to look like new.