the lake level. This high level is maintained with slight undulations up to the falls. The indications are that the latter were originally located at Lewiston and Queenston, and have, in the course of ages, cut their way back to their present position. The depth from the crest of the gorge to the river varies from 200 to 300 feet, and its width from 1,500 feet at the falls to 220 feet at the lower end of the Whirlpool rapids.

In subsequent articles we shall deal with the engineering and industrial features of Niagara Falls, and it will be sufficient at this time to briefly indicate these features as shown on the accompanying bird's eye view of the river and its environs. The depth and turbulence of the river have necessitated some costly and difficult bridge work. About a quarter of a mile below the American Falls is the Niagara Falls and Clifton arch bridge, built last year to replace the suspension bridge which for many years was a familiar feature of the landscape. This is the longest arch bridge in existence (868 feet span), and to our thinking is the most beautiful of its kind in the world. A mile and a half below we come to the cantilever bridge which carries the tracks of the Michigan Central Railroad, and forms a link in the great trunk system of the New York Central Railroad between New York and the West. Closely adjoining it is the new steel arch bridge completed last year, replacing the old railroad suspension bridge on the same site. It carries the tracks of the Grand Trunk Railroad, and so forms a link in the route of the Canadian Pacific system. A few miles further down the river the new Lewiston and Queenston suspension bridge is in course of erection; and when completed it will form an important element in an electric belt line which will extend the full length of the gorge on either side, crossing it to the north at Lewiston and to the south by way of the Niagara Falls and Clifton bridge already referred to. Fuller details and illustrations of these bridges will be given in a subsequent issue.

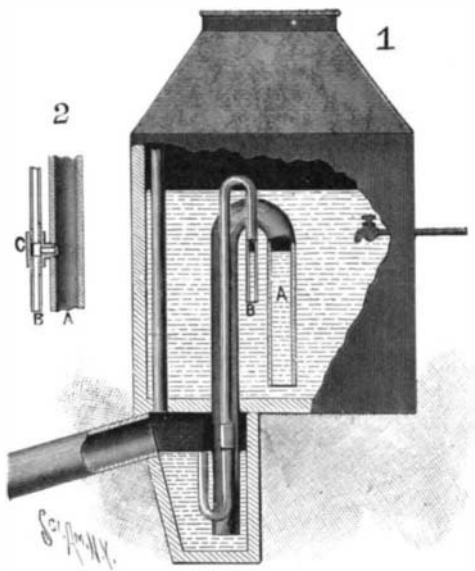
Ever since the year 1725, when a small sawmill was erected at the falls, their vast store of energy has appealed to the mechanical instincts of man and invited his co-operation; but it is only of late years that any serious attempt has been made to utilize this energy on a large scale. By far the largest modern plant is that of the Niagara Falls Power Company, whose canal and power house is situated about a mile above the American Falls, and therefore above the upper rapids, as shown in our front page engraving. The water is led in from the river by a canal which is 12 feet deep by 180 feet long, and of sufficient capacity to deliver water for the generation of 100,000 horse power. At the side of the canal is a huge wheel pit, 30 feet wide by 200 feet long and 180 feet deep. Water is led from the canal to the bottom of the pit by eight steel penstocks, each 8 feet in diameter, and at the base of each penstock is a 5,500 horse power vertical turbine. Each main shaft carries at its upper end, within the power house, a 5,000 horse power generator, the total capacity of the plant, as now established, being 40,000 horse power. Provision is made within the pit for two more turbines, the total proposed capacity of this house being 50,000 horse power. Another power house of equal capacity is shortly to be built on the opposite side of the canal, and the company has franchises which will allow it to erect a 250,000 horse power plant on the Canadian side when it is prepared to do so. The tail race of the present power house is carried through a tunnel 7,000 feet in length, which was driven from the bottom of the wheel pit in a straight line beneath the town of Niagara Falls to an outlet at the base of the cliffs just below the abutments of the upper arch bridge. The outlet is marked on the bird's eye view on the front page. The Niagara Falls Paper Company, whose works adjoin the power house of the Niagara Falls Power Company, utilize 7,200 hydraulic horse power, taking the water from the canal and discharging into the tunnel.

Next in importance is the Niagara Falls Hydraulic Power Company. It owns a canal, shown on our engraving, which leaves the river at a point above the rapids and 2,000 feet below the canal of the Niagara Power Company, and runs through the town to a basin situated near the edge of the gorge and a quarter of a mile below the upper bridge. Here it is led by two penstocks, one 8 feet and the other 11 feet in diameter, to a power house 200 feet below at the edge of the river, where its energy is developed in a series of horizontal turbines. The present installation represents a capacity of 10,500 horse power, and this is to be increased shortly to 20,000 horse power. By extending the terminal basin northward along the cliffs, enlarging the canal and building another power house at the river level, below the present small users of the canal water, it is proposed to develop 100,000 horse power. The franchise allows the company to develop 125,000 horse power from the river.

The canal, which was built in 1858, also supplies a number of industrial works which utilize only a part of the available head of 210 feet. Most of the turbines operate under a head of from 60 to 100 feet, and about 7,500 horse power is developed in this way. The tail race discharge is through a tunnel or through an open cut in the face of the cliff.

On the Canadian side, the Niagara Falls Park and River Railway has a power house opposite the Horseshoe Falls in which are two turbines working under a 68 foot head, with a combined capacity of 2,000 horse power.

Including then all the various users of the Niagara River waters for power purposes, we find that at the present writing, of the total theoretical horse power of 7,500,000, less than 50,000 horse power is being actually developed and turned to useful account. The contracts already made by the two great power companies call for an increase upon this of about 60 per cent.



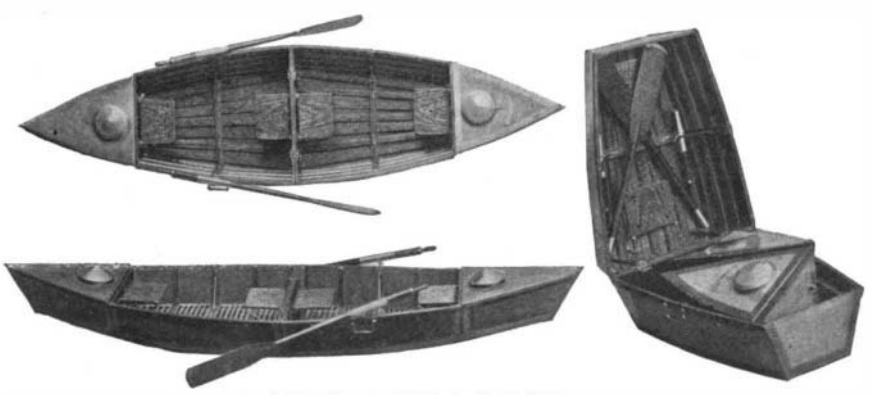
McQUISTION'S AUTOMATIC SIPHON.

The accompanying map of Niagara shows the various lands acquired by the companies, which they propose to rent out to such industrial concerns as wish to locate on their property and use the companies' power. Of these companies, the Niagara Falls Power Company alone own 1,071 acres, while the Niagara Falls Hydraulic Power and Manufacturing Company own 70 acres, as indicated on the map. The industries already established and using the electrical power are very numerous, and include the manufacture of paper, aluminum, carborundum, calcium carbide, peroxide of sodium, and other chemical industries. The street railway systems of Niagara, the Gorge railways and the railway to Buffalo, 22 miles distant, are operated by electricity generated from the Niagara waters, Buffalo alone taking 6,000 horse power for its city railroads and other power purposes. The present indications are that industries will move to Niagara instead of the electricity generated at the falls being transmitted to any great distance for industrial purposes.

A NOVEL PORTABLE FOLDING BOAT.

An improved portable folding boat has been invented by John Osmond, 921 W. 12th Street, Chicago, Ill., which is adapted for the use of travelers, hunters, fishermen, and prospectors.

Our illustrations show the boat with its folding and removable parts in various positions. The boat comprises essentially two middle sections and two end sections. The two middle sections are hinged together so they may be folded together, one section being used as a cover for the other. The two end sections are detachably connected by bolts with the middle sections, so that they may be placed within the middle sections when not in use. In order to lock the two middle sections together when they are extended, bolts are used which are provided with washers to prevent leakage. When the four sections are in position and bolted together, a complete boat is formed having pointed ends constituting buoyant air-chambers. The end sections, when not in use, are placed within the middle sections, and serve as storage compartments for provisions. The seats of the boat are so hung that when the parts are folded, they may be swung out of the way. The oars, in order to be readily stored in transportation, are made in detachable sections.



OSMOND'S PORTABLE BOAT.

AN AUTOMATIC SIPHON.

A patent was recently issued to Charles F. L. McQuistion, of Butler, Pa., for an automatic siphon especially adapted to the flushing of sewers and drains where the flow of water is small or intermittent. Fig. 1 is a partial section of the device; and Fig. 2 is a detail showing a portion of the siphon and of a vent-pipe employed.

The siphon, *A*, discharges into a trap or water-seal. A vent-pipe, *B*, similarly bent to the siphon, *A*, has its lower end within the trap and above the siphon-discharge, and its upper end above the bend of the siphon. The upper end of the vent-pipe is located above the siphon-intake and below the siphon-bend, a distance exceeding the depth of the seal at the lower upturned end of the vent-pipe. As shown in detail in Fig. 2, the vent-pipe, *B*, and the siphon, *A*, are connected by a passage running through a fitting, *C*.

The upper portions of the vent-pipe and siphon are arranged in the water-collecting tank. As the water rises in the tank, it enters the intake of the siphon, *A*, until it reaches the level of the upper end of the vent-pipe, *B*. As the water rises, the air in the pipes is compressed, but is prevented from escaping by the water-seals at the discharge ends of the pipes. A continued compression of the air by the rising water will finally blow out the water-seal at the lower leg of the vent-pipe, thus causing the water rapidly to rush into the upper ends of the pipes and to empty the tank.

Should it be so desired, the upper part of the vent-pipe can be omitted; but in this case the compression of air begins immediately upon the rise of the water in the tank.

The Removal of Tattoo Marks.

In the Archives de Médecine Navale for October there is an instructive article by Dr. Félix Brunet, a junior surgeon of the French navy, on Détatouage, or the art of removing pictorial designs and inscriptions from beneath the outer skin. Soldiers and sailors—the latter especially—are notoriously fond of this species of adornment, but men at best are but fickle creatures, and with advancing years many among them become anxious to be relieved of the too persistent records which they then no longer look upon as ornamental. As Dr. Brunet says, there are few naval medical officers who have not been asked by patients to remove tattoo marks: but, unfortunately, when their services are thus required they are obliged to depend upon their own resources, as little or no information is afforded by the text-books.

It is true that an immense number of methods have been recommended, both in ancient and in modern times, but all are more or less inefficient, while many of them are barbarous. Tattooing varies so considerably as to site, extent, and depth that no single method, however elastic, can possibly answer in all cases. Dr. Brunet enters into an elaborate historical survey of his subject, exhibiting a vast amount of erudition. Among other stories he tells once more how Bernadotte died rather than lay bare his arm for phlebotomy. In his salad days Napoleon's famous general had been an ardent republican, and had he consented to the uncovering of the limb, an elaborate design attesting to his unalterable devotion toward the Republic One and Indivisible would have come to light.

In conclusion Dr. Brunet formulates his procedure as follows: "The empirical means proposed for the removal of tattoo marks being either inefficacious or dangerous, while the scientific expedient of repricking with various caustics is insufficient, we propose a method, more complicated but surer, and separable into the following stages: (a) delimitation of site to be operated on by diachylon plaster, anæsthesia by cocaine; (b) vesication by ammonia; (c) removal of epidermis, free rubbing of exposed design by nitrate of silver pencil; (d) after five minutes' salt or boricated water dressing, to be renewed the next day, when also the diachylon may be removed; (e) cicatrization under powder formed of equal parts of iodoform, red bark, charcoal, and salicylate of bismuth. This method is not applicable to all cases. Sometimes, notably in tattooing of the face, dissection is the best treatment. When a very large design is in question, it can be dealt with piecemeal." The method would probably be drastic, but whether its author is quite consistent in reflecting upon the barbarity of other processes while recommending his own is open to question. Any such method certainly should not be attempted except under the direction of a surgeon.

BEER tabloids are to be put on the market in Germany. It is said one of the small tablets dropped in a glass of water will, in a few moments, turn it into a glass of beer.