

THE CHICAGO DRAINAGE CANAL.

Elsewhere in this issue will be found a technical description of the Chicago drainage canal, and in this connection a brief review of the considerations which led to its construction will be of timely interest.

It was the modern problem of urban life—the perennial supply of pure water and the sanitary disposition of the sewage—which brought the drainage canal into existence. There is evidence enough to even the transient visitor in Chicago of the need of a new order. The offensive odor from the stagnant, sewage-laden waters of Chicago River especially in summer is a daily and deadly menace to the health of the community. The emptying of the city's sewage into Lake Michigan, whence the city's supply of drinking water is drawn, is contrary to all laws of hygiene and sanitation. The water supply and sewerage system of Chicago have long been unsatisfactory. Something had to be done.

Among the relief measures proposed, the drainage canal seemed most desirable and feasible. Its advantages were convincing. To reverse the flow of the Chicago River away from the lake; to restore the ancient western discharge of Lake Michigan into the Desplaines valley; to utilize the connection thus made with the swift current of the Mississippi; to inaugurate an internal navigable waterway which would not only dispose of all the water and waste of Chicago, but also of every community upon its banks—these were the main features of an undertaking which it is seen is one of the boldest for the improvement of internal navigation which has ever been seriously conceived and conducted by engineers anywhere in the world. While New York, Philadelphia, and Boston are put to tremendous and continual outlay to secure a good water supply, Chicago by its audacious expedient is conserving and safeguarding an inexhaustible reservoir at its door. Furthermore, the connection of the sanitary canal with the scheme for a navigable waterway to connect the Great Lakes with the Mississippi River and the Gulf of Mexico renders the project of more than local importance. The only outlet at present for lake vessels is through a canal on Canadian territory, around Niagara Falls. Commercial interests in the West and South are uniting in support of a demand that the Federal government take a hand in carrying out the contemplated plan.

On the other hand, however, considerable opposition has blocked the way. The project has had to cut its way through seemingly dead walls of litigation. The effect of the new outlet on the lake levels has been a prolific source of discussion. The cities along the lower lakes have been greatly exercised as to the possible effects of the drainage scheme on the depth of water in their harbors and channels. In view of the shallowness of Erie harbors and of the fact that the government has recently completed its work of deepening the navigable channels ten feet, at a cost of \$2,000,000, the question of the danger of lowering levels seems to become serious. As on all technical matters, authorities have differed. While some experts have held that the new channel will permanently lower the level of Lakes Michigan, Huron, and Erie from three to eight inches, and thus cause a corresponding reduction of from 240 to 700 tons in carrying capacity for the large vessels of the lakes, other eminent engineers have contended that the effects on the interests of navigation are immaterial (possibly 3-10 foot reduction), and even if they be considered serious, that the remedy may be easily applied. The remedy involves the storing of water in Lake Superior and letting it down when needed, an enterprise which is a story in itself.

The inland cities south of Chicago have naturally shown a lively interest in the proposition. They have begun a series of tests of the character of the water in the Illinois River, which tests are to determine the degree of impurity caused by the sewage discharge. The question of overflow has also been a moot one among dwellers along the river banks.

It is St. Louis whence naturally emanates the most serious opposition. This obstruction first culminated in a report by an investigating committee which implied that Chicago is bound to purify the sewage before casting it upon the waters to contaminate the water supply of a neighboring city, for St. Louisans drink the Mississippi River water without filtration. As such a purification plant would cost \$50,000,000, and \$3,000,000 annually for maintenance, to construct it is asking a good deal even of Chicago. An injunction suit, entered by St. Louis, January 22, is now pending in the United States Supreme Court, on which action will be taken April 2.

In consequence of all that is involved, the ship canal is a necessary and inevitable result of the work which has created the largest artificial waterway yet constructed. As long as a tangible scheme is held out as a practical project of the early future, it appears to the impartial observer that the people bordering the lakes should be willing to put faith in the well-supported statements of the Chicago engineers, as should the people along the Illinois and Mississippi Rivers be willing to waive their doubts on the sanitary side. The

attitude of St. Louis in the matter, in view of its own method of sewage disposal, seems quite inconsistent.

EMPLOYING THE CARABAO FOR ARMY PURPOSES IN THE PHILIPPINES.

The relative value of the mule and the carabao, or, as it is commonly called, the water buffalo, for army purposes in the Philippines has been a subject of speculation and experiment during the operations of our army in the archipelago through the rainy season. The almost indispensable character of the carabao to the natives made it seem advisable to try the creature for transport service in place of the mule, and several trains of ammunition and provisions have been carried in the rear of our army by the buffaloes. These bull trains for transportation purposes have proved a success under certain conditions. Where haste and dispatch are necessary they are dismal failures, but if no particular hurry is essential to the expedition, they offer some points of superiority to the mule train. They are more to be depended upon in hot, wet countries like the Philippines during the rainy season than the army mule, but in any other land they would be of little use. The bulls are as strong as almost any animal in existence, rivaling the elephant in their ability to haul whatever they are hitched to; but they are large, clumsy, slow, and phlegmatic animals. They cannot be driven faster than their ordinary gait, which at the best is almost at a snail's pace. As an instance of their slowness, an army train of bulls was recently dispatched with a load of provisions and ammunition from the Bagbag River to San Fernando. Although only a distance of 12 miles, it took the bulls over half a day to cover the distance.

The peculiar necessity of their bathing frequently in the rivers in order to keep up their spirits and strength during a journey is both an advantage and disadvantage. In traveling through the country in the rainy season, rivers and swollen streams are encountered every mile or so, and crossing these is a pleasure rather than a disadvantage to the carabao. In fact, they must bathe frequently, or they will succumb to the heat and fatigue of the journey. If given all the bathing they want, the carabao bulls will work continuously, and never show signs of exhaustion; but cut them off from all water for any length of time, they will drop down dead in harness. This dependence upon water for bathing, and their great slowness, are the chief points against them.

The flies, mosquitoes, and other insects in the Philippines are so large and numerous that even the mules are seriously disturbed by them, but the carabaos after bathing in the muddy streams have their bodies so coated with mud and slime that the insects cannot bother them. It is partly for this protective purpose that they roll in the muddy bottoms, for undoubtedly long experience has taught them the value of this coat of dry mud.

The government has bought up considerable droves of these animals for army uses, and they are employed constantly in carrying pack trains across the rough country when the mules are needed for other purposes. Our men have not yet thoroughly learned the art of driving and controlling these strange beasts of burden. The Chinamen are the best drivers of the carabaos, and a "Chino" driver is employed for every one that is sent out with a provision train. The animals are quiet and docile if handled properly, but if crossed or angered they show a temper and power that makes them more formidable than the native warriors to fight off. The "Chino" drivers know how to favor the beasts, and when to give them water and when to make them leave the stream. With stones and loud shouts they force the animals to come out of their bed of water and mud and stand up in line for yoking again. Sometimes, however, half an hour is wasted in getting the carabaos harnessed ready for resuming the journey. They are trained so well that they step into line and over the shafts as carefully as a gentle horse waiting to be harnessed.

The animals are rudely yoked to the carts, and are driven by means of a rope fastened to a ring in their noses. The "Chino" drivers control them by means of this rope and loud shouts similar to those used by a farmer in steering his yoke of oxen. The animals are so slow of foot that they were ruled off the principal street of Manila because they impeded the progress of traffic and caused frequent trouble. The beasts are able to strike a good gait, however, as witnessed many times in runaways. Then they show a fleetness of foot that surprises all who are not thoroughly acquainted with them, but their hide is so tough that the drivers cannot prod them deep enough to force them to a faster trot. A wild carabao is not an agreeable animal to meet, and there are immense herds of them roaming in the islands. Several times they have charged upon our soldiers in anger and caused a sensation of more importance than a charge of the native soldiers. With their long horns and powerful muscles they are able to give a whole regiment all the work it needs for a short time. The bullets from the rifles do not always kill or even cripple the wild beasts, and a charge cannot be checked by a volley or two from well-

directed rifles. The shooting sometimes serves to anger the animals instead of intimidating them, and they plunge through the deep grass and jungles like a maddened herd of elephants, and sometimes prove almost as formidable.

These wild buffaloes come from the interior, where many natives spend their time in capturing and taming them. It takes a long time to tame the wild creatures and break them into service. Some old bulls absolutely refuse to be tamed, and they show their resentment for capture up to the time of their death. Most of those in service are born and bred in captivity, and the young calves are very easily trained for use. Still enough of the wild carabaos are caught every year to keep the stock from degenerating. They take to civilized life much more readily than our American bison, resembling in this respect the true water buffalo of India.

The strength of these animals is marvelous. In respect to size, strength and ponderousness they resemble the elephant more than any other creature. They simply haul anything that is hitched behind them, and it is the shaft or traces that break if the load cannot be moved. Across all sorts of rough and miry country they pull the load, although they have not the sure footing of the mule in climbing steep and rough mountains and hills. They are better in the soft, miry lowlands which compose so large a part of the Philippines. When angered and running away, they dash across the country with their heavy load as if it was so much light, flimsy cotton. Not only are they then regardless of what is behind them, but also of what may rear itself in front. Be it a river, a fence, ditch or jungle, or another cart, the maddened animal plunges blindly through or across it, and never halts until disabled or its anger has evaporated. In the latter case it then suddenly becomes as meek and docile as before. If whipped for its misdeeds, its meek eyes seem to ask why it is punished, and they look as innocent as those of a child or a deer. In truth it is a strange animal, and not much unlike the natives of the islands which it inhabits. G. E. W.

FACTORY INSPECTION OF NEW YORK STATE.

The "Annual Report of the Factory Inspectors of New York State" makes a volume of 950 pages, and gives a mass of statistical information which is most interesting. During the year the inspectors have visited 35,716 separate establishments and factories, and many of them were in out-of-the-way villages, and it required considerable time and travel to reach them. Altogether, the total number of places visited one or more times was 48,800, and out of this number 15,192 had orders issued against them. The total number of accidents of all kinds reported in factories was 1,626, the total number of fatal accidents in manufactories was 45. The interest manifested by the people of the State in the work of the department is very gratifying. The importance of the provision of the law relative to scaffolding, ropes, etc., has not been fully realized but by a very few of even those whose interests are protected thereby. Five complaints were made about defective scaffolding, and in each case a full compliance of the law was secured. During the year the department found 20,191 children between fourteen and sixteen years of age employed in factories, etc., throughout the State. The total number of certificates for children under sixteen years of age filed by the various Boards of Health throughout the State was 16,240. The department devoted its attention with marked success to the question of fire escapes, labor laws relating to the hours of work, ventilating tenement houses, workshops, etc.

THE NEW GOVERNMENT PRINTING OFFICE.

The new building for the Government Printing Office is now being erected at North Capitol and L Streets, Washington, is to be seven stories in height, and is, of course, thoroughly fireproof. It is to be provided with twelve electric elevators which will run in shafts lined with glazed brick. In case of fire, four large stairways will furnish a means of exit. All the presses are to be actuated by electricity; the larger ones are to have independent motors. The current will be supplied from an adjacent power house. Everything is to be done to make it in every way a model printing office, and when the vast number of books and documents issued by the Government is considered, it will be seen that it will be most economical for the Government to have the best possible plant obtainable. The public printing office supplies every Custom House, Land Office, Internal Revenue Office, Pension Agency, Post Office, the Consular Service and all of the Departments with all the blanks they need, this alone requiring an enormous job printing plant. Special attention is given to doing work with great celerity, as is often required in Congressional matters, and in emergencies the work is done at night. Thus, the manuscript report of the "Maine," of which we have already published an abstract, was received at six o'clock P. M. on March 28, but complete copies bound in paper were on the desks of the members of Congress at ten o'clock the next morning.