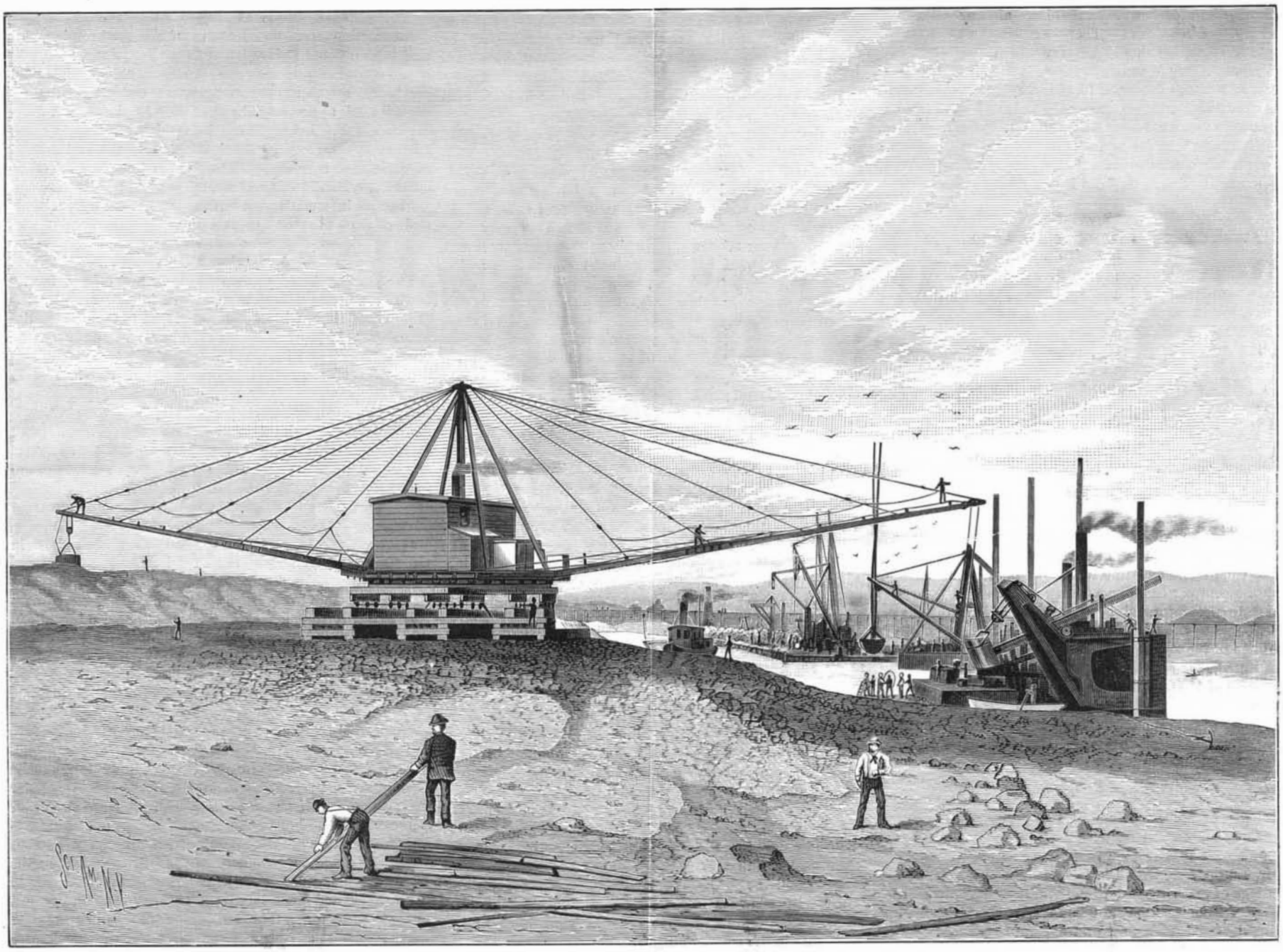
IMPROVED REVOLVING DERRICK.

This important improvement in the economy of hoisting and removing earth, rock, or other material, has now been in use for some two or three years on the work of the inventors, who are contractors on the "Quebec Harbor Improvements." It consists, essentially, of a circular platform mounted upon wheels which run upon a circular track. This circular platform carries two or more booms, arranged symmetrically, and combined with suitable hoisting apparatus for raising material upon one side and moving it to any point within the sweep of the boom. The circular platform of the derrick now in use is forty feet in diameter, with a mast thirty-eight feet high, and booms of one hundred and ten feet each, thereby making the total swing of the derrick two hundred and twenty feet. The revolving machinery consists of a pair of 6 x 10 cylinders, connecting by bevel gearing with a vertical shaft, at the lower end of which is a pinion working with a circular rack of 12 feet diameter. This pinion is held securely in gear by the steadiness of the circular platform upon its track, and is not affected by any slight vertical motion of the platform. The hoisting is done by an additional pair of engines, 8 x 14 cylinders, connecting with two friction drums working independently, thus enabling the operator to hoist and revolve the load simultaneously.

The circular track is laid with steel rails and is firmly supported upon the lower platform, which is of sufficient strength to resist the great weight and strain brought upon any given point. The step or socket at foot of the mast consists of heavy bearing plates with a central orifice adapted to conical rollers upon which the mast rests. The booms are supported upon the platform, the inner end resting in a socket at the foot of the mast. They are suspended by wire ropes from head of the mast and secured against lateral strain by guys connecting with the platform. Obviously the weight of the structure rests mainly upon the circular track, and when any one of the booms is loaded the wheels and the rollers upon which they rest on the loaded side form the support for the said load, and become the fulcrum over which the loaded boom acts as a lever, the whole circular platform and opposite boom serving as counterbalancing weights to hold the platform in place and enable it to securely carry the load.

Heretofore, although derricks have been in common use for hoisting heavy materials and transferring them over short distances, as from the wharf to shipboard and the reverse, the only practical way which has been found for removing heavy masses of earth or other material to any considerable distance has been the laborious and expensive method of carting or wheeling.

By the revolving derrick material can be hoisted to any desired point, and removed horizontally from two to four hundred feet, for it is plain that by increasing the circular platform and elongating the mast the sweep of the booms can be readily extended to the latter distance. The derrick can be worked and moved from point to point either by means of crib-work or piles and ordinary railroad track, or by a suitable float. The present derrick has been used chiefly for removing material directly from a dredge of a working capacity of some 1,200 cubic yards per day, a full load of the dipper or bucket being about 4½ tons, but bowlders weighing over 8 tons have frequently been removed without the slightest injury to any part of the machinery. The working capacity of this derrick may be fairly stated at 50 revolutions per hour.



MOORE & WRIGHT'S REVOLVING DERRICK.

The Science of War.

The "science of war" means something more than it used to, when war was merely the opposing of brute force with brute force. An illustration of what it now implies is furnished by the *Avenir Militaire*, in an account of the apparatus employed in French gunnery practice, for the translation of which we are indebted to the *Iron Age*.

The force and velocity of the wind is first measured by an anemometer. Then the weight of the atmosphere must be determined by a barometer, because sights adjusted to a certain barometric pressure must be changed if the pressure varies. Next a hygrometer is used to determine the amount of moisture in the air, as this determines to some extent the resistance encountered by a projectile in its flight. If the object aimed at is out of sight, the use of the plane table or planchette is necessary. Then the gunner must employ the telemeter to measure the distance of the object to be struck, and when all preparations are made he consults the thermometer to see what the temperature is, since allowance must be made for contraction and expansion of the metallic sights. He is then ready to blaze away, but how many instruments he needs to determine the course of his projectile and the effect of his shot we do not know.

With such refinements in gunnery, we should think it would not much longer be necessary to kill men, although it is probable that some mortality will result from trifling errors in calculation, or because the soldiers shot at will not stand still while the gunner is calculating his aim. All that is desired by the most bloodthirsty enemy is to place as many as possible of the opposing force *hors de combat;* then scientific surgery comes in, and it will soon be that, if enough pieces can be collected, the worst wounded men can be put together and patched up so as to be almost as good as new in a few months. It is at least satisfactory to know that the greater the progress in scientific warfare and in the improvement of arms, the fewer are killed and wounded in battle. In the days when opposing forces used to stand at arm's length and hack each other to pieces with short swords and axes, very little was known about the science of war; but more men were often killed in a day than could now be brought into the field by any but a first-class military power. Perhaps it will come some day that, instead of making war, the powers at variance will merely send each other a statement of their military preparations, whereat the weaker power will make the necessary concessions.

Influence of Watering on the Germination of Seed.

In his researches upon this subject, Professor Just has found that seeds which have been thoroughly dried for a long time can be raised to a temperature of 120° C. without losing their germinative power, if only they be *slowly* exposed to moisture. But if their thoroughly dried-up protoplasma is suddenly drenched with water they are killed, in just the same manner as frozen plants are killed if too suddenly thawed. To favor the rapid introduction of water in the course of his experiment, Professor Just bored holes in grains of wheat, an operation which under ordinary circumstances does not affect the germinative power of more than 15 or 20 per cent of the grain thus treated. These seeds were then carefully dried at 30° to 40° C. over sulphuric acid or chloride of calcium, and one portion of them slowly moistened, while the other was quickly impregnated with water. Of the latter only from 10 to 15 per cent retained their germinative power, while of the former it was destroyed in only about the same proportion of cases.

IT is a curious fact that in some lines of manufactures the Canadians are beating the Yankees in economy of production. For example, the Waterous Manufacturing Company, of Brantford, Ontario, have, we learn, for some time past been delivering steam engines in Bremen at less prices than the American makers can put them down there.

BLACKING.—Mix intimately 1 pound of molasses, 1 pound of best bone-black in *very* fine powder, and ¼ pound olive oil; then add ¼ pound sulphuric acid, previously diluted with ¾ pound water. The whole is allowed to stand for three hours or longer, and afterward as much water is added as is necessary to give it the proper consistence.