SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XLVIII.—No. 17. [NEW SERIES.] NEW YORK, APRIL 28, 1883. [$3.20 per Annum. [POSTAGE PREPAID.]

THE OTTAWA RIVER DAM.

One of the largest dams, if not the largest, in the world was built recently by the Canadian Government on the Ottawa River, about forty miles above Montreal, at a place called Carillon, and at the head of the rapids of the same name. The rapids are two miles long, with a fall of ten feet. The contract for this work, and a large slide which forms a part of it, was awarded to Messrs. F. McNamee & Co., of Montreal, in 1879, and was completed in 1881.

The plans of the dam and slide were made by Mr. Horace Merrill, of Ottawa, an engineer of the Department of Railways and Canals, one of the best and most experienced builders of dams and slides in the Dominion. The work was superintended by Mr. Merrill, assisted by his son, H. B. Merrill, at present a resident of this city, and to whom we are indebted for this information. To Mr. A. G. Nish, a member of the firm above mentioned, is due in a great measure the successful completion of the work.

The dam was built to raise the level of the Ottawa River to supply a new canal constructed at the same time, and as it closed several channels in the rapids, through which the greater portion of the square timber cut on the upper Ottawa and its tributaries passed, it necessitated the building of a slide 600 feet long by 28 feet wide for its passage. The magnitude of this work will be comprehended when it is understood that where the dam was built the river is 1,800 feet wide, with a depth ranging from 2 to 19 feet, and a current of 9 miles an hour; the bottom of the river being very uneven. The levels of the river were taken by Mr. Andrew Bell, resident engineer at Carillon, under whose supervision the canal was constructed. The dam was built on a foundation of narrow piers from 36 to 46 feet long, with spaces between carried to the bottom, but where the depth was too great they were built solidly from the bottom up for a short distance. The up stream ends of the piers were sheeted with 4-inch plank. The piers were built up to one level, and covered with 12 x 12 inch timber, making a platform across the river from 36 to 46 feet wide, the spaces between the piers allowing the surplus water to pass through. Upon this platform the flat dam, Fig. 1, was erected, the rear portion of the platform being first covered with 10-inch tamarack. The dam was also covered with 10-inch tamarack, and its crest protected by half inch boiler plate; 113 gates were made of timber 10 inches thick, and fastened to the sloping side of the dam with large wooden hinges, B, to cover the spaces between the piers, and they were all successfully closed the afternoon of November 9, 1881.

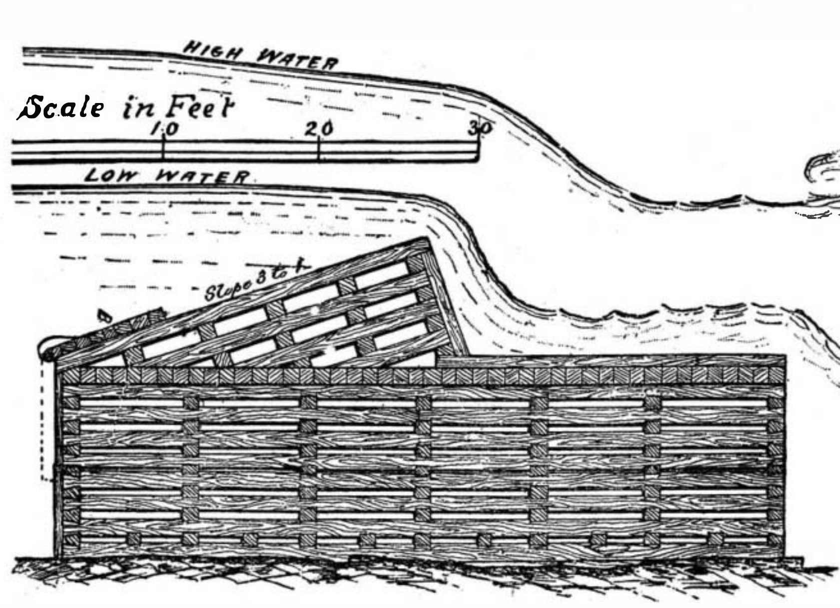
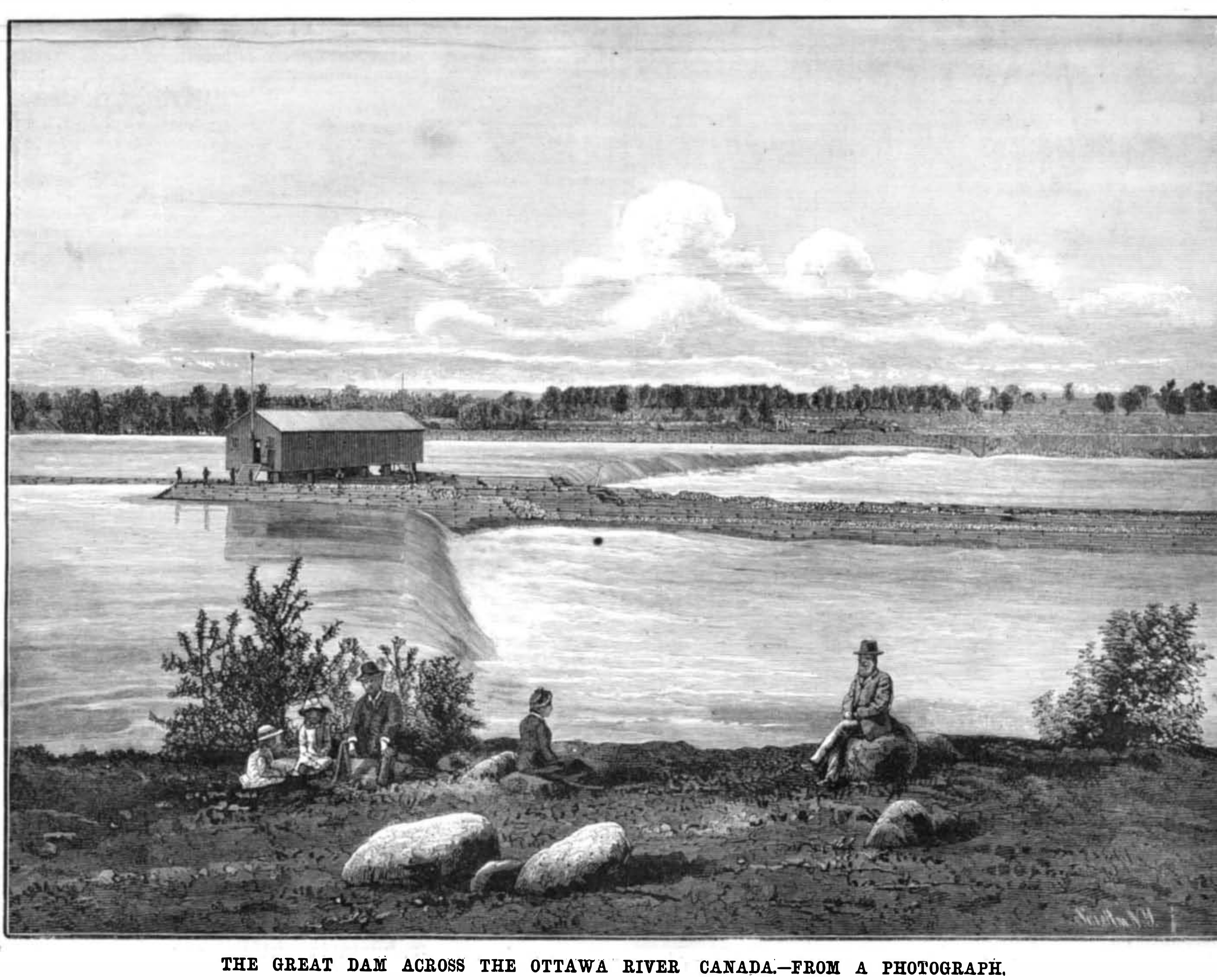


FIG. 1. CROSS SECTION IN DEEP WATER.

The foundation piers were securely bolted to the rock, and well filled with stone, as was also the dam. The level of the river was raised 8 feet, the depth of the water on the crest of the dam being 2 feet in low water, in high water 10 feet. To complete the above work a temporary dam had to be constructed above it to break the force of the current, an undertaking equally as difficult as that of the permanent work.

The slide has two guide booms, each 2 feet 6 inches deep by 3 feet wide, and nearly half a mile long, supported by large piers; it is provided with stop logs at its head to control the supply of water. A crib of timber will pass through the slide (600 feet) in about one minute.

The quantities of materials in the different portions of the work, and the cost, are as follows, viz.:



THE GREAT DAM ACROSS THE OTTAWA RIVER CANADA.—FROM A PHOTOGRAPH.

	Cubic feet Timber.	Pounds Iron.	Cubic yards Stone.	Cost.
Temporary Dam....	134,500	92,000	11,400	$79,000
Permanent Dam....	265,000	438.600	24,000	151.000
Slides, Booms, Piers.	296.400	156,400	32,800	102,000
	695.900	687,000	68,200	$332,000

DOES GOOD WORK PAY?

Properly considered, this question admits of but one answer, and yet there are advocates of "cheap" work and excusers of slighted jobs among our manufacturers; men who claim that close competition and close bargaining are circumstances which permit, if they do not exact, passable rather than excellent work. A business run among the shops and factories in the same line of production, in the same or adjacent localities, where each shop has equal or similar facilities, shows that no two of them will furnish the same estimates of the same job. Indeed, in some instances, the difference in the terms is quite surprising when it is considered that the materials and the methods and facilities of working them are the same. Under these circumstances the only possible means of lowering price is by slighting work, sure to be detected sooner or later, to the injury of the maker's reputation and the ultimate loss of the cream of his business. This is particularly true of the manufacture of tools and machinery; in either case poor workmanship is certain to reveal itself. And when a tool gives out in the using, or a machine breaks down, the user and owner does not console himself with the consideration that he "got it cheap," but he execrates the maker as heartily as though he had paid the highest market price; and he goes no more to the low-priced manufacturer, neither does he recommend his productions.

The manufacturer who "puts the work" into his tools and machinery is building up for himself a cumulative extending reputation for excellence of product that is far more valuable than a reputation for low prices only. In fact, the price of a piece of work is not absolutely high nor low; it bears a relation to its cost of production. A high priced article may be cheaper than a low priced one, and should be if the proper relation between price and value is preserved. In fact, high prices do not repel so many would-be customers as first-class workmanship attracts.

The truth of this could be attested by the success of a firm whose productions have a reputation extending far beyond the limits of this country. Their specialty is the manufacture of machine tools, and within less than twenty-five years has grown from a shop of four employes to an establishment of more than seven hundred hands. At the beginning the tools made by this company bore a high price, and as compared with most others in the same line of manufacture the prices have always been high. Yet the fact of the building up of a large business from insignificant beginnings proves that the high prices have not offset the benefits arising from good work. And that has been the main object for which this company have striven from the first. No job ever went out from this establishment "scrimped" in workmanship because of an error in contracting too low. "Better lose dollars than reputation," has been the principle of the company. They have always used the best materials, employed the best skill, exacted the finest work, and aimed at producing superior tools. For years their name has been synonymous with the highest possible excellence in their line, and their tools are regarded as standards of comparison. Substantial prosperity has kept pace with constant improvements, and it is much more the result of producing first-class work than of shrewd business management or fortunate contracts.

This single case, taken as an example for illustration, is not an isolated and peculiar one. There are producers by manufacture in this country and others whose name is a guarantee of excellence, a protection to purchasers and users, and an evidence of the prosperity almost certain to follow earnest, honest endeavor to do good work.

Arizona Coal.

The Deer Creek coal fields, near the San Carlos Reservation, Arizona, promise great results. They were discovered in 1881, and active developments began last March. The coal is found in fifty veins of greater or less size, which have been open, and extends for a full mile in width. Seven shafts have been sunk in different places on the property, the deepest being some 200 feet. In this deepest shaft, as in all the others, the coal has been followed all the way down, and at the depth of 150 feet a cross cut has been made through 30 feet of sandstone, striking another vein of coal 15 feet wide. Above this shaft, on the next vein, a 100 foot tunnel has been run, showing a face of 8 feet of coal about 45 feet from the surface. A cross cut from this tunnel shows a vein of 7 feet of coal at the same depth. West of this tunnel, and about 100 yards distant, there is a shaft of 40 feet down on an incline, so that any one can walk in at any time and see one of the finest bodies of coal on the property. In addition to these developments there are several other shafts where the veins have been cut, showing coal from 6 to 25 feet in width.—*Arizona Star.*

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 261 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

NEW YORK, SATURDAY, APRIL 28, 1883.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 382,

For the Week ending April 28, 1883.

Price 10 cents. For sale by all newsdealers.

THE GREAT BRIDGE ALMOST COMPLETED.

The trustees of the great suspension bridge over the East River, between New York and Brooklyn, have announced that the structure will be thrown open to the public on the 24th day of May, 1883. This will be a notable day in the history of these two large cities. The event will be celebrated by festivities appropriate to the occasion. Probably half a million of people will join in the procession across the bridge, forming a rare and wonderful sight. The question of fares and tolls is yet to be settled. In addition to ample space for foot passengers and ordinary vehicles, there will be a double track railway, with commodious passenger cars, constantly moving back and forth, like shuttles over the bridge.

RELATIVE COSTS OF STREET LIGHTING BY ELECTRICITY AND GAS IN NEW YORK.

New contracts for lighting the streets of the great city of New York have just been awarded, to begin May 1. The price to be paid for gas lighting for the closely inhabited part of the city, in which by far the larger portion of the lamps are located, is $17.50 per year per light. In the outskirts and sparsely inhabited regions, from $19.50 to $32 per gas light is to be paid.

The use of electric lights will be continued in portions of Broadway, Fifth Ave., including certain parks and squares, in all a length of about six miles, at 70 cents per night per light. Arc lights are used of the Brush Company, also of the United States Company's styles. Each electric light displaces six gas lights. The contract price for each electric light amounts to $225 per year per light, which is rather more than double the cost of gas in the chief parts of the city. It is conceded, however, that the quantity of light furnished by an electric lamp is much greater and better than that yielded by the six displaced and dingy gas lamps. The streets that are illuminated by the electric light present an attractive and brilliant appearance. Reckoned by quantity of light supplied, the arc lamps are far cheaper than gas. Not so, however, with the incandescent system—the Edison system, for example, which is not at present used for street lighting in New York. Each small Edison light, not quite equal in force to an ordinary gas light, costs rather more than gas.

MAKING A DRILL CHUCK.

In these days, when almost every appliance used in the machine shop may be obtained ready-made, at any mechanics' supply store, it may seem unnecessary to suggest methods of fitting ordinary lathe appliances. But there still are many shops unprovided with attachments of a handy character except these which are home made, and even when the ready-made articles are obtainable there may be occasions when the workman finds it preferable to get up his own attachment.

There are plenty of handy drill chucks to be found in the market suited to almost all the exigencies of work, but if the contingency just referred to should arise, it is well to know how to produce a good drill chuck from shop materials and appliances.

The preferable method of making a drill chuck to be used in the lathe is to drill, bore, and thread a suitable block to screw on the live arbor of the lathe, in place of the face plate. A cylindrical casting, or a piece cut off the end of a bar of round iron, will furnish the stock for the chuck. Drill a hole in one end of this of sufficient length to comprehend the threaded portion of the lathe arbor and the lathe center, the hole being of sufficient diameter to receive the center. Then enlarge this hole by boring to a depth sufficient to receive the threaded portion of the lathe arbor, and chase the thread in the hole to fit the arbor.

The first stage is now completed. Screw the block on the lathe spindle, and drill, from the other end, the hole for the reception of the drill shank. Turn and finish the outside of the chuck to taste. With a chuck of this sort there is no necessity of removing the lathe center when the chuck is to be used.

Sometimes the workman wants a drill chuck that shall take the place of the center in the lathe arbor. In this case the drill chuck must have a tapering shank corresponding with that of the lathe spindle center. The turning of this shank on the proposed chuck is frequently the first part of the work attempted. This is an entire reversal of the proper method; it is impossible to get the true center of the piece proposed for the chuck by this wrong method.

To produce a chuck of this style, cut a piece off a bar of round iron of the proper diameter for the boss of the chuck, and long enough to receive the shank of the drill and to form the shank of the chuck that takes the place of the shank of the lathe center. Chuck the piece and drill the hole for the reception of the drill shank. Then lay the unfinished chuck aside, and cut another piece long enough to form a shank to fill the receptacle of the center shank in the lathe arbor, and the hole just drilled in the proposed drill chuck.

Turn this piece to fit the center hole in the lathe arbor accurately, put it in place, and then turn the projecting portion to fit the hole in the proposed chuck. Drive the chuck on, and by rotating it the true center will be found. From this center turn the shank for the hole in the lathe arbor, and perfect truth will be assured.

A CUBIC foot of water weighs $62\frac{1}{2}$ pounds, and contains 1,728 cubic inches, or $7\frac{1}{2}$ gallons.