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FIRE AND FIRE ENGINES IN THE OLDEN TIMES.

BY WILLIAM PERRY, HYDRAULIC ENGINEER, MONTREAL.
(Continued from last issue.)

Notwithstanding the superiority of pump engines over the syringe, many years elapsed before they were generally adopted. "The English (observes a British writer) appear to have been unacquainted with the progress made by the German engineers, or to have been very slow in availing themselves of their discoveries, for in the 16th century 'hand squirts' were introduced in London for extinguishing fires, and it was not till the beginning of the next that they began to place them in portable and larger reservoirs; when placed in the latter and worked by a lever, the engines thus obtained were considered a great mechanical achievement, for when in 1633 three of them were taken to extinguish a large fire on London bridge, they were considered such excellent things, that nothing that ever was devised could do so much good, yet none of them did prosper, for they were all broken." The observation that "hand squirts" or syringes were placed in reservoirs and then worked by lever, is not strictly correct. They were small forcing pumps that were employed. A syringe could not act at all if permanently fixed in a vessel, because it discharges the water through the same orifice by which it receives it. Some improvements were made on fire engines by Greatorix in 1656, as mentioned by Evelyn; that they were is not known. The probability is that they related to the carriage or sled. If his engines were the same that were advertised in 1658, this was the case, for they were recommended as "more tra-

versable in less room, and more portable than formerly used."

The oldest account of English fire engines that I have seen is a small old quarto, the title page of which is wanting. From two poetical addresses to the author it appears that the initial letters of his name were I. B., and that the work was entitled "A Treatise on Art and Nature." Two-thirds of it are occupied with "water-works," and the rest with "fire-works," except four or five pages "on voyces, calcs, cryes and sounds," i. e., on making of whistles, etc., for sportsmen to imitate the voices of certain birds and other game. The date of publication was about 1634; this, we infer from its speaking of "The engine near the north end of London bridge (he observes), which engine I circumspectly viewed as I accidentally passed by, immediately after the late fire upon the bridge. Anno 1633" Shops and dwelling houses were built on both sides of the bridge at that time.

After describing several modes of raising water by sucking, forcing and chain pumps, he continues: "Having sufficiently spoken concerning mills and engines for mounting water for meer conveyance, thence we may derive squirts and petty engines to be drawn upon wheels from place to place, for to quench fire among buildings, the use whereof hath been found very commodious and profitable in cities and great towns." Hence engines were at this time not uncommon in England. No less than seven are figured by the author, and all are placed in cisterns or tubs mounted on wheels; neither air vessels nor hose pipes are described or mentioned. Five of the engines consist of single cylinders; of these some are in a perpendicular position, others are laid horizontally, and one is inverted and fed by a branch pipe covered by a valve. The last one figured has two horizontal cylinders, a suggestion of the author's, and the piston rods are shown as worked alternately by pallets or arms on a vertical shaft, to which a reciprocating rotary movement was imparted by pushing a horizontal lever to and fro. One of these old fire engines is a species of bellows pump, the construction of which I will endeavor to explain: Two brass vessels were connected at their open ends to a bag of leather; they resemble, both in shape and size, two men's hats, the linings of which being pulled out and sewed together form a cylindrical bag between them. A circular opening, six or seven inches in diameter, was made through a horizontal piece of plank fixed in the cistern of the engine, and over this opening one of the vessels, with its crown upwards, was placed, and made fast by screws through the rim, the other vessel being suspended from it by the bag and hanging loosely in the water. Within the lower vessel (in the centre of its bottom) a valve opening upwards admitted the water, and on the top or crown of the upper vessel another valve, also opening upwards, was placed. Over the last valve the base of the jet pipe was secured. To work this machine, the rim of the lower vessel was connected at opposite points by two iron rods or slings and a cross head to the end of a lever, by which the lower vessel was moved up

and down—compressing the bag when raised, and stretching it to its natural length when lowered. To make the vessel rise and fall perpendicularly, the two rods were passed through holes in the plank. Water was kept in the cistern as high as the plank, so that when the movable vessel was raised the contents of the bag would be forced into the upper vessel and expelled through the jet pipe, and when it was again lowered the water would enter through this valve and fill both as before. These engines, he observes, had sometimes two levers and were worked by two men, "the lower brasse (vessel) being poysed with two sweeps."

The goose-neck was used in England at that time. It is not represented in the figures, which are very indifferently executed, but it is sufficiently well defined in the description of one of the engines. The author directs a hollow ball to be placed on the orifice of the forcing pipe, "having a (jet) pipe at the top of it, and made to screw another pipe (elbow) upon it, to direct the water to any place."

Small hand engines continued to be employed in London in the 18th century. This appears from a law passed in the 6th year of Queen Anne's reign, by which it was enacted that "each parish shall keep a large engine, and a hand engine, and a leather pipe, and socket of the same size as the plug or fire cock (of the water mains), that the socket may be put into the pipe to convey the water clear to the engine," under a penalty of ten pounds. In case of fire, the first person who arrived with a parish engine to extinguish it was entitled to thirty shillings, the second twenty, and the third ten, provided the engines were in good order, "with a socket or hose, or leather pipe." The following year the owners or keepers of "other large engines" (not parish engines) were entitled to the same reward upon arriving with them and assisting in extinguishing a fire.

It is a singular proof of the general ignorance of hydraulic machinery, or want of enterprise in London pump makers of the 16th and 17th centuries, that they so long continued the use of "squirts" and engines with single cylinders, when they had daily before their eyes in the Thames waterworks examples of the advantages of combining two or more to one pipe. The application also of such machines as fire engines was obviously enough shown to them, for when Maurice had finished his labors in 1582, the mayor and aldermen went to witness an experiment with his pumps at London bridge: "And they saw him throw water over St. Magnus's steeple, before which time (says Stow) no such thing was known in England as this raising of water." Immediately subsequent to the above date, the "squirt" manufacturers might surely have imitated Maurice's machine, but they did not for nearly a hundred years afterwards, that is, not until such engines had been introduced a second time from Germany, and designed expressly to put out fires.

Before the improvements of Newsham and his contemporaries of the 18th century, some important additions would seem to have been made in England, since, previous to 1686, "the engine for extinguishing fire" was claimed as an English invention. This is stated in a small volume published that year in London by John Harris, and apparently edited by him. It is entitled "A pleasant and compendious history of the first inventors and institutes of the most famous arts, misteries, laws, customs and manners in the whole world, together with many other rarities and remarkable things

rarely made known, and never before made public, to which is added several curious inventions, peculiarly attributed to England and Englishmen."

The fire engine which Schottus witnessed in operation at Nuremberg in 1656, appears to have been equal to any modern one in the effects ascribed to it, since it forced a column of water, an inch in diameter, to an elevation of eighty feet. One German author says a hundred feet. It was made by John Hautsch, who, like most of the old inventors, endeavored to keep the construction of his machine a secret. He refused to allow Schottus to examine its interior, though the latter it is said readily conceived the arrangement, and from his account it has been supposed the cylinders were placed in a horizontal position. The cistern that contained the pumps was eight feet long, two in breadth, and four deep; it stood on a sled ten feet in length and four in width, and the whole was drawn by two horses. The levers were so arranged that twenty-eight men could be employed in working them. The manufacture of these engines was continued by George Hautsch, the son, who is supposed to have made improvements in them, as some writers ascribe the invention of fire engines to him.

In the 16th century, no place could have furnished equal facilities with Nuremberg for the fabrication of, and making experiments with, hydraulic machines. It was at that time the Birmingham of Europe. "Nuremberg brass" was celebrated for ages. Its mechanics were so numerous that, for fear of tumults, they were not allowed to assemble in public "except at worship, weddings and funerals." No other place, observes an old writer, "had so great a number of curious workmen in metals." The Hautschs seem to have been favorites with the genius of invention that presided over the city; an aptitude for, and an inclination to pursue, mechanical researches were inherited by the family.

For nearly a hundred years after the date of Hautsch's engine, those used throughout Europe, with the exception, perhaps, of a few cities in Germany, were very similar to those described by Belidor, as employed in France in his time. They consisted simply of two pumps placed in a chest or cistern that was moved on wheels or sleds, and sometimes carried by men like the old sedan chair. These engines differed from each other only in their dimensions and the models of working them. One belonged to Strasbourg, the other to Ypres. The front part of the cistern in which the pumps are fixed is separated by a perforated board from the hinder part, into which the water was poured from buckets. The cylinders were four inches in diameter, and the pistons had a stroke of ten inches. Each pump was worked by a separate lever, an injudicious plan, since a very few hands could be employed on each, and as the engine had no air vessel, it was necessary, in order to keep up the jet, that the piston should be raised and depressed alternately—a condition not easily performed by individuals unused to the operation, and acting under the excitement of a spreading conflagration. The contrivance for changing the direction of the jet was very defective, and considering the date of the engines, it is surprising that such a one was then in use. A short leathern pipe would have been much better. The jet pipe was connected to the perpendicular or fixed one by a single elbow, instead of a double one, like the ordinary goose-neck. The joints were also made differently. The short elbow piece had a collar or ring round each end, and the jet and per-

pendicular pipes, where they were united to the elbow, the same. The faces of these collars were made smooth, so as to fit close to, and at the same time turn on each other; loose flanges on the pipes were bolted to others on the elbow, and thus drew the collars together so as to prevent water from leaking through. Now it will be seen that although the joint which unites the elbow to the perpendicular pipe would allow the jet pipe to be turned in a lateral or horizontal direction, there appears no provision to raise or lower it, and no apparent use at all for the joint. We were at first at a loss to divine how the stream could be directed up and down as occasion might require, for Belidor has not explained it; but on examining more closely the figure in his work, we found that the jet pipe itself was not straight, but bent near its junction with the elbow. This solved the mystery, for it was then obvious that by twisting this pipe round in its joint, its smaller orifice could be inclined up or down at pleasure.

The pumps of the engine at Ypres are substantially the same as those of the last, but the piston rods are moved by a short vibrating beam placed directly over the cylinders. The axle of the beam is continued through both sides of the wooden case, and to its squared ends two iron rods are fitted, like crank handles on the axles of grindstones. To the lower ends of these rods are attached, by bolts, two horizontal bars of wood, on the outside of which a number of long pins are inserted. When the engine was in use men laid hold of these pins, one man to each, and pushed and pulled the bars to and fro, somewhat as in the act of rowing, and thus imparted the requisite movement to the pistons, a mode of working fire engines that might, we think, be adopted with advantage in modern ones, for the vigorous working of these is so exhausting that the strongest man can hardly endure it over a minute at a time. The jet pipe of this engine is connected to the other by coupling screws or "union joints," the most useful and ingenious device for joining tubes that ever was invented; and one which, from its extensive application in practical hydraulics, in gas or steam works, and also in philosophical apparatus, has become indispensable. I notice it here on account of its having been erroneously attributed to a modern engineer; whereas it was not new when introduced into Ypres fire engines above a hundred years ago. In closing allow me to say Canada has done as much as any other country in the world to invent and improve fire engines, the credit for which is largely due to the Perry family, and I have the honor to be one of them.

For THE CANADIAN ENGINEER.

THE BOUZEY DAM FAILURE AND THE QUEBEC LANDSLIDE.

BY C. BAILLAIRGE, C.E., QUEBEC.

The failure of the Bouzey dam in France, following on that of Johnstown and so many others of a significantly fatal nature, must afford food for reflection as to whether we do not rely too much on theory and mathematics, and too little on common sense considerations.

This dam was 1,400 and odd feet in length at bottom, and over 1,700 feet at top, 40 feet high above bottom of reservoir, and its thickness equal to half its height. The specific gravity of its components of construction was 2.0, or 125 lbs. per cubic foot.

Uncomplimentary though it be to my French confreres in the profession, I must say that the cross section of the dam, as given in *Engineering*, London,

Eng., and reproduced in *THE CANADIAN ENGINEER*, has a very unscientific and inadequate looking profile, with far too much masonry below the bottom of the reservoir, and far too little of it at the centre of pressure.

The fact is that with dam walls, as with ordinary earth-retaining walls, the mortar or other cementing material cannot be relied on to persist in its pristine qualities of adhesiveness, in its efficiency to bind the masonry for all time to come, or even for such a comparatively small period as 30 to 50 years.

Now since a dam or other retaining wall will and does become, so to say, water-logged or saturated with moisture to the extent of—under the effects of frost and chemical decomposition—disintegrating the mortar and reducing it to sand, as observed in hundreds of cases under similar circumstances; since it must and will come to be in 20, in 50 or in 100 years that the cementing material will have lost its binding qualities and the masonry become reduced to the state of a dry stone wall; since this is inevitable, for a dam must or should be supposed to endure for all time or for centuries, like the pyramids, like the Roman aqueduct, etc.—therefore must it be contended and admitted that, while doing the best we can in the way of enduring cementing material, the dam or retaining wall should be built of such thickness that the binding matrix need not be relied on, and the mere dead weight of the masonry, as if a dry stone wall, made sufficient to stand the thrust of the pushing water or back filling, whatever it may be.

The writer has advocated this years ago in alluding to the failure of the Montreal harbor wall along Commissioners street, which, though hardly 50 years old, has been long giving way, as has also almost every wall built by the Federal and Local Governments, and the old Government of "United Canada" during its last forty years. The Louise embankment walls, now less than ten years old, are all bulging out on their way to ruin.

Canadian engineers are becoming fully alive to this, and retaining walls, as those erected by the C.P.R., are made to approximate more in thickness to the full height of the material to be supported or retained, or of which the thrust is to be efficiently counteracted; as witness, also, the Baker dam of the New York aqueduct, and others of recent construction.

The Bouzey dam failed, such is the generally received opinion—see *New York Engineering Record*, etc.—from the dam becoming buoyant by infiltration from below, or due to the probably cracked state of the up-stream cement coating, thereby losing so much of its weight (as does a stone in water), that what remained of such weight was insufficient to stand the pressure.

The dam gave way at a point below its centre of pressure, by sliding on its base, or over, or along the underlying masonry, and no wonder it did, since the co-efficient of friction of dry stone is but .5, while the specific gravity of the dam was but 2.0, leaving not only absolutely nothing as a margin or factor of safety, but showing the wall to be only half the thickness or weight required, even if not water-logged or buoyant to stand the pressure, or resist the tendency to slide forward; and if water-logged or saturated, and the joints thus lubricated with water, this co-efficient of .5 must have been considerably reduced, and in a way to overcome the supposed co-efficient .7 of repose (static), that of motion (kinetic) reducing to .5.

What, then, should the thickness of the dam have

bottom, had by seismic action, and the contraction of the earth's crust in cooling, been thrown or puckered into folds of which the upper portions have since been worn away by erosion and the hand of time, leaving the present almost upright or vertical layers of rock, which have assumed a fan-like structure, or have become divergent at top, as shown in the accompanying figure, by the infiltration of water and earth, or gravel in the interstices or interfoliations.

Now, had this rock been of a solid nature, or, ex-foliated as it is, had each stratum been monolithic or a solid bed or layer of stone, and attached or rooted as the layers may be supposed to be and are, to the underlying portions of the layers below *CE*, the 46,875 tons pressure against the cliff or wall at *DC* would have been impotent to move the cliff; but each stratum or vertical layer is divided by planes of cleavage into parallelo-pedons, as usual in such schistous or slate-like formations.

Again, had these planes of cleavage been normal or perpendicular to the strata, or, as they would then have been—horizontal—the mass of rock *ACEB* could be assimilated to a wall or series of juxta placed walls made up of dry stone with horizontal beds. But neither in this loose state could the static pressure of the water in the crevasse *CD* have caused the cliff *ABEC* to move; for the co-efficient of friction of dry stone on dry stone, if taken as given by Coulomb, Morin and others at .5—a force equal to half the weight of the cliff moved forward, or the half of 120,169 tons (60,084½ tons) would have had to be exerted to overcome the friction and thrust the strata forward.

Now, as will be seen, the face of the cliff at *BE* leans forward 6 feet in 60 feet (1 in 10) as measured from *B* to *P* (top of the debris of the fallen or overthrown portion of *BF* of the cliff, by the 7 inch push it received from the rear by the movement forward of the unfallen portion *ABEC*). Moreover the planes of cleavage inclined forward some 20° on an average to the horizon. This added to the 7° which the rock leaned forward at *BE*, thus giving the planes of cleavage an inclination of 27° to the horizon, reduced the resistance to overthrow to one-half of what it would have been had the joints been normal to the vertical or plumb line; since to move a body down an inclined plane to 27°, or of which the height is twice the base, requires only half the weight, or a counterpoise of half the weight, to hold it there.

The force required to move or thrust the rock forward was therefore reduced by half; so that while, with horizontal joints or planes of cleavage, it would have required .7 (coefficient of friction of starting or of repose) of the 120,169 tons, or 84,128.3 tons, it only required half of this, or 42,064.1½ tons (the coef. of friction in motion being .7 of what it is at rest, or $.7 \times .7 = .49$, say .5), and it has been seen that the pressure exerted by the water was 46,875 tons, or just a little more than adequate to push the rock forward, though the result may also have been partly brought about by the joints of cleavage being filled with an unctuous stratum of clayey substance, and thus rendered more slippery, and the coef. of friction less than that assumed.

The most incredulous must now be ready to admit, however reluctantly, that since a water pressure of, say 47,000 tons, has been able to thrust forward an almost solid mass of stone of 65 feet, or very nearly in thickness equal to two-thirds the height or depth of the impounded water, and weighing 120,000 tons, or more

than 2½ times the pressure or weight of water, so much the more readily would it have moved the resisting mass had it been composed of mere ordinary masonry, of which the cementing matrix had become more or less deteriorated or destroyed by water infiltration, frost, or other atmospherical or chemical causes.

If the writer does not in this case of the Bouzey dam use the .7 coefficient of static friction instead of the kinetic .5, it is that it must be deemed more prudent to recommend such a ratio, as the least concussion, the least shock of an earthquake, which almost all the world is still subject to every now and then, might, added to the pressure of water, start the dam, and thus render it obligatory, so to say, to use the safer figure .5 instead of .7.

There has not been that amount of scientific curiosity or interest displayed by engineers or technologists in respect to this question of the Quebec landslide of 1889, which the magnitude of the phenomenon, or its reduction to mathematical computation, would warrant, but now that it is shown to bear so thoroughly, so directly on an almost identical case of the overthrow of the dam at Bouzey, with its disastrous consequences of some 130 or more lives lost (the number of casualties in the cliff case being over 50), engineers may feel more interest in an examination of the overthrow, and the writer will at any time be most happy to accompany any engineer or other scientist to the site of action, at the southwest end of Dufferin Terrace, Quebec, and point out to them the proof positive of the moving forward of the 120,000 tons mass of cliff by just so many inches; the stopping short of the motion forward being due to the fact that the moment the fissure opened, the water fell within it and at once reduced the pressure, which, therefore, not being continuous as with a reservoir, the action was, so to say, instantaneous, and with nothing to follow up the effect and cause the complete overthrow of the 120,000 tons of cliff.

In conclusion, it will be seen that if in addition to the cementing material being destroyed by infiltration, and which, when taking the coef. of friction to be overcome at .33 or ⅓, would require the weight of the dam above any point in its height to be three times that of the pressure or weight of water above same point or level; if in addition to this the dam be water-logged or buoyant, or liable to become so, and thus lose so much of its weight, the thickness will have to be further increased by a percentage equal to the difference.

For THE CANADIAN ENGINEER.

WATT'S DIAGRAM AND MULTIPLE EXPANSION ENGINES.

BY JOSEPH R. OLDHAM, M.E., CLEVELAND, OHIO.

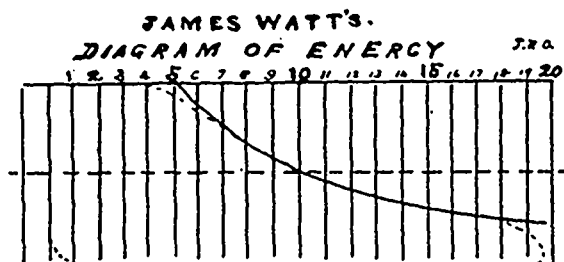
This is the age of scepticism with regard to authors, scientists, and, possibly, inventors also. Shakespeare has been strongly and authoritatively accused of plagiarism, or at least of actions very much akin thereto. Newton was not, it is said, a great and original physical law giver, but only a clever and clear essayist or delineator of the thoughts and writings of more enlightened thinkers and investigators, and now James Watt is only allowed to be an inventor who added two or three mechanical devices to Newcomen's steam engine.

Bunyan, I think, has been left in undisturbed possession of his own works, perhaps because it is thought he suffered enough torture in a damp prison, without having his dry bones disturbed by frightful accusations

of plagiarism. For my own part I would no more think of writing a general article on the steam engine without mentioning Watt's achievements than I would attempt to write an essay on the laws of motion without acknowledging the debt due by all physicists to Sir Isaac Newton.

At a time when the greatest crisis in the history of a free people had about reached its maturity by the signing of the Declaration of Independence, another crisis was also nearing its fulfilment some three thousand miles away from here, for coincident with the dissipation of autocratic misrule forever over this country, came the dispersion of much ignorance in connection with steam and steam engines, by the enlightened labors, if not solely by the original discoveries of James Watt; parenthetically, let me remind you that these stupendous events happened just about half a century after "Great Newton spake and all was light." Fifty years after this date, the great pioneer of the steam engine was laboring assiduously to perfect the most civilizing and peace distributing agent known either to the arts or sciences (I hazard this opinion, notwithstanding William Ewart Gladstone's assertion that "The violin has done more to civilize mankind than the steam engine"). For it was in the same year that our colonists declared their independence that Watt declared the nature of his invention, in the British patent office, for utilizing steam expansively. Think of that, and then cast your retrospective mental vision up at those stupendous buildings which were in Chicago some two years ago, and on which the name of Watt stood emblazoned, and consider "What a mighty leap was that." Without the steam engine, no such buildings could have been constructed in ten times the period available, and if Watt had not discovered the advantages of using steam expansively, that wonder of the centuries (the White City at Chicago) might have been delayed for many years, and thereby culture, science, art, and the highest type of civilization been kept back for a decade or more.

It appears that as early as 1776, a date well known to all Americans, Watt made experiments on the expansion of steam, and about that time he altered an engine at the Soho works so as to test the result of an early cut-off. Six years later he took out a patent, in the specifications of which he states that his improvements consist in admitting steam into the cylinders of the engine only during some part or portion of the stroke of the piston and using the elastic forces, where-with the said steam expands itself in proceeding to occupy larger spaces, as the acting powers on the piston through the other part or portions of the length of the stroke of the said piston. This was the first published example of the diagram of energy as applied to a steam engine.



In the accompanying sketch consider the horizontal lines above and below the centre line as a sectional view of the walls of a cylinder. Divide the length of the

cylinder into, say, twenty equal parts, allowing for clearance. Assume that steam at the atmospheric pressure (14 pounds on the square inch) is admitted freely while the piston travels over five divisions and is then cut off. Hence at division 10 the pressure will have fallen to $\frac{1}{2} \times 14$, or 7 pounds. At division 15 it will be $\frac{1}{3} \times 14$, or $4\frac{2}{3}$ pounds, and at division 20 it will be $\frac{1}{4} \times 14$, or $3\frac{1}{2}$ pounds. Whereby it appears that only one-fourth of the steam necessary to fill the whole cylinder is employed, and that the effect produced, stated briefly, is equal to more than one-half of the effect which would have been produced by one whole cylinder full of steam. The expansive principle is the same, though steam be expanded in one cylinder, as above described, or in several cylinders.

A Brown hoist would not be made any higher by substituting a six ply rope for the single steel wire now used, nor would any absolute gain result from the change. It is the same with the bulk of steam, the energy of which is not increased by the addition of any number of cylinders; the steam will give up the same amount of energy if expanded in one (low pressure) cylinder, only as it would if previously expanded by steps in several cylinders, though practical difficulties make it necessary to subdivide the total expansion into separate stages, but this has nothing to do with the principle of expansion as delineated by Watt.

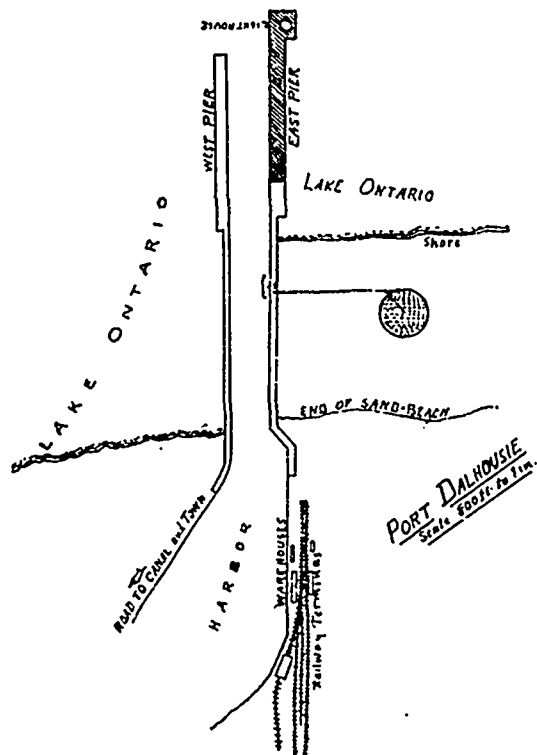


WATT'S EXPERIMENTS.

Although increase in steam pressure has been the chief aid to progress in marine engineering, it is remarkable to observe how cautiously and slowly such increase came about. Up to the year 1850 the load on the safety valves, as a rule, did not exceed 10 pounds per square inch. Ten years later the corresponding boiler pressure was 20 pounds. In 1865 it had risen to 30 pounds. In 1872 the load on safety valves of a number of typical steamers was $52\frac{1}{2}$ pounds per square inch, but in 1874 a mighty leap was taken by the late Dr. A. C. Kirk, of the firm of Robt. Napier & Sons, who designed the triple expansion engines of the "Propon-tis," which were worked by the Rowan water tube boiler, with about double the last pressure mentioned; a few years later several small steamers—notably the S.S. "Anthracite," which was constructed under the superintendence of the writer—were fitted with the Perkins engines and boilers, working at about 300 pounds pressure, but such high pressures were rapidly abandoned, and in 1891 the average was $158\frac{1}{2}$ pounds. Steam pressures are now rapidly increasing, and it may be that before many years such pressures as the "Anthracite" carried with her Perkins boiler will be the rule rather than the exception.

HARBOR IMPROVEMENTS AT PORT DALHOUSIE.

Some interesting pioneer work in a certain style of pier building is now being carried out at Port Dalhousie, Ont. We should qualify the expression "pioneer" by saying that work of this kind has been done at Buffalo in the United States, and in various European harbors, but so far no work of this kind has been done in Canada, owing to the plenitude and cheapness of timber. This work is now being done by Battle and Newman, of St. Catharines and Thorold, and consists in the substitution of blocks of concrete for the present timber piers. An attempt was made to do the work by another contractor last year, but it was thrown up, and the present contractors have undertaken the continuance of it in a systematic way which augurs success. The work is being done on the east pier as far as the



shaded part indicated in the accompanying plan; the work for the balance to be carried out in future seasons. The narrow part of the pier is 20 feet, and the wide shaded part 30 feet. The concrete is made in blocks 4 feet by 4 feet and 6 feet deep. These are prepared on the shore near the pier, and moulded on a large circular table, so that 100 blocks can be made at once within the swing of a derrick-boom of 50 feet. The blocks after being made are swung on a tram car and carried thereon to the channel, where they are swung on to a scow by means of a stiff-legged derrick, and thence carried to their places in the pier. A layer of these large blocks is made in white Portland cement on each side of the pier, and all the intervening space is filled up with a bed of solid concrete from hydraulic cement, made by the Estate of Battle at Thorold. In the present contract 1,500 barrels of Portland cement and 3,000 barrels of hydraulic cement will be used. The top of the pier is finished with a floor $1\frac{1}{2}$ ft. thick of concrete, nicely rounded at the edges of the pier, and having mooring rings cemented in at distances of 60 feet. The present season's contract applies to about 900 feet of the pier and has a fine appearance. The work is under the superintendence of James Battle, assisted by two able foremen, G. W. Read, of Port Dalhousie, and Geo. Boyd, of St. Catharines. The Government supervising engineer is W. G. Thompson.

THE NEW ELECTRICAL INSPECTION ACT.

Canada is the first country on this continent to adopt an Act for the inspection of electric light. The only step the United States has taken is to legalize the units agreed upon at the recent conference, which almost every other country in Europe and America has done. But in Canada provision is now made for the inspection of electric light and current the same as for gas. The new Act came nominally into force in April, but the organization was only completed last month under the direction of O. Higman, who has not only put his administrative machinery in motion without friction, but has framed it on lines of the greatest possible economy. He has taken the gas inspection services, and by teaching the gas inspectors the use of the instruments and the test board which he has devised, has made his new department simply an evolution of the gas inspection department. No new branch of our complex system of governmental machinery has ever been erected at so little expense.

For the information of our readers we give a list of the staff, and the districts over which each inspector has jurisdiction:

John Williams, London.—Inland Revenue Divisions of London, Windsor and Stratford.

D. McPhie, Hamilton.—Inland Revenue Divisions of Hamilton, Brantford and St. Catharines.

J. K. Johnstone, Toronto.—Inland Revenue Divisions of Toronto, Guelph and Owen Sound.

Wm. Johnson, Belleville.—Inland Revenue Divisions of Belleville, Kingston, Prescott, Cornwall and Peterborough.

H. G. Roche, Ottawa.—Inland Revenue Divisions of Ottawa and Perth.

A. Aubin, Montreal.—Inland Revenue Division of Montreal, Three Rivers, Terrebonne and Joliette.

N. Levasseur, Quebec.—Inland Revenue Division of Quebec.

A. F. Simpson, Sherbrooke.—Inland Revenue Divisions of Sherbrooke, St. Hyacinthe, St. Johns and Sorel.

A. Rowan, St. John, N.B.—Inland Revenue Divisions of St. John and Chatham.

A. Miller, Halifax, N.S.—Inland Revenue Division of Halifax, Yarmouth, Pictou, Cape Breton and Charlottetown, Prince Edward Island.

The work of inspection is being inaugurated by Mr. Higman, as chief electrician; his headquarters being, of course, at Ottawa. These inspectors are experts in the use of the photometer, and the apparatus for testing gas and gas meters, and Mr. Higman states that the task of instructing them in the use of the necessary electrical testing appliances has not been a difficult one. A summary of the Act appeared in last issue.

Power is given by the Act for the testing of incandescent lamps for candle power, and it is understood that companies will be required to send to the department a sample of each style or make of lamp given out to their consumers.

There is a scale of fees for the verification of meters from 75 cents up to \$3.50, according to the capacity of the meter. This verification is made once every five years, but the company or consumer may have meters tested oftener if they have reason to believe the meter is not correct. In the periodical verification the company pays the fee; in the case of special tests, the party at fault pays the fee.

THE LAKE LEVELS AND THE CHICAGO CANAL.

The report from Chicago that Governor Altgeld, of Illinois, has vetoed the bill for the canal under construction to connect Lake Michigan with the Mississippi, is satisfactory news, alike to Canadians and Americans interested in the navigation of the great lakes. Engineers differ as to the effect of this canal on the lake levels, but many reputable professional men think it would lower the lakes by six to nine inches. To show our government the seriousness of the case, we have only to contemplate the results of such a change in a year like this. On the first of this month the water in the 27½ ft. channel of the St. Lawrence at Montreal was 28 ft. 5 in. against 31 ft. 2 in. in 1894, making a fall of 2 ft. 9 in. Add an additional six inches, or perhaps a foot, to this fall (for we cannot be sure that the lowering might not be greater in the rivers and canals than in the lakes), and we would have a chain of waterways that would be practically unnavigable for the vessels that now ply in our waters. Even as it is, vessels are continually bumping and grounding on the canals, and the R. & O. boats are put to a great deal of inconvenience in transferring passengers and luggage to smaller boats coming down the rapids. Canadians cannot risk the possible injury such a canal would cause to our most vital interests; and any lowering of the lake levels would be equally injurious to cities on the American side of these great waterways.

As to the veto of Gov. Altgeld, on the ground that this was a Federal and not a State question, we presume this refers to a bill providing for the balance of funds, as three years work amounting to \$10,000,000 has already been done on the canal, and it is estimated that \$15,000,000 more will be required to finish the work, which was intended as a canal for both drainage and navigation purposes. The Canadian Government must not go to sleep over this matter, which could be taken up in detail by the three commissioners they propose to appoint to sit with the American commission on the deep waterways scheme. It is worth stating that the directors of the Richelieu and Ontario Navigation Co. have memorialized our Government on the subject, and among American cities, Cleveland, through its Chamber of Commerce, has petitioned the Secretary of War to ascertain the effect of this canal.

ONTARIO GOOD ROADS ASSOCIATION.

The history of the inauguration of a great public work generally deals with the opposition it encountered on various sides, and recounts the great endurance of its promoters and their well-earned success; when we look into one of the greatest achievements of this century, the establishment of the steam railway, we admire the energy and perseverance of those who promoted and brought to such successful termination this vast public improvement. Whilst the history of the end of the second decade of this century records the battles of the gauges and other triumphs of Stephenson, a perusal of the history of public works in the end of the last decade will be a source of surprise to the future writer, when he studies the story of how the public roads of this Province were improved. It will be a revelation to him that a large number of professional men of high standing, and many representative business men, aided in a most liberal manner by the Government of the Province, labored continuously for over two years in spreading the gospel of good roads without being

able to induce the rural municipalities to undertake the greatly needed improvements. There is good reason to believe the day is not far distant when these municipalities having adopted the advice so liberally and freely given to them, and acknowledged the benefits derived from good roads, will express surprise that they delayed so long to promote their own advancement.

The improvement of roads is the only great public work which has ever been offered to the public, in which there is no need of shareholders, a stock list, or Government grants. Every well cultivated township has an ample fund at its disposal in the value of the yearly statute labor, to not only spend a sufficient sum in making first-class roads, but to maintain them also in perfect order. We have read with deep interest the recently published second annual report of the Ontario Good Roads Association; the work is full of most valuable information on technical points by experienced and qualified writers. A. W. Campbell's paper, "Good Roads," will be a lasting memorial to his diligence and ability as a writer on professional topics, whilst the practical information and hints drawn from his experience as a road engineer, place before the novice a sufficient fund of facts on which he can commence work without much fear of failure.

The association is to be congratulated on its work. Although named the second annual report, the association has actually only had one year's existence and experience. It may not be able to point to any direct improvement in road making during its existence; it can with justifiable satisfaction point to its work in lecturing and the information its members have so generously placed at the disposal of their fellow citizens. Four civil engineers contribute papers: A. W. Campbell, on "Good Roads"; W. M. Davis, on "Road Construction and Maintenance"; Alan Macdougall, on "Historical Roads," and P. K. Hyndman gives a few practical suggestions for the improvement and maintenance of the roads of Ontario; the farmer's side is presented by A. F. Wood. J. C. Judd writes on the statute labor law, and Judge Woods on drainage laws applied to good roads. Appended to the report is a special bulletin, copies of which are being spread broadcast by the Government.

ELECTRICAL CONVENTION.

It has been decided to hold the next annual convention of the Canadian Electrical Association at Ottawa, on Tuesday, Wednesday and Thursday, the 24th, 25th and 26th of September. Those connected with the association in Ottawa are working to make this convention the best yet held, and the delegates will be well cared for during their stay in Ottawa. The Governor-General has manifested his interest in the association by placing his electric launch at the service of the members, while W. Y. Soper, of Ahearn & Soper, will treat the association to a garden party at his residence, and a local committee is arranging other entertainments for the guests.

The executive of the Canadian Association of Stationary Engineers, who also hold their convention in Ottawa during the same month, are considering the question of holding their sessions at the same dates. There is so much of common interest to the two organizations that if the sessions can be so arranged as to harmonize and give both the benefit of papers and discussions of general interest, a combined assembly would be of great advantage.

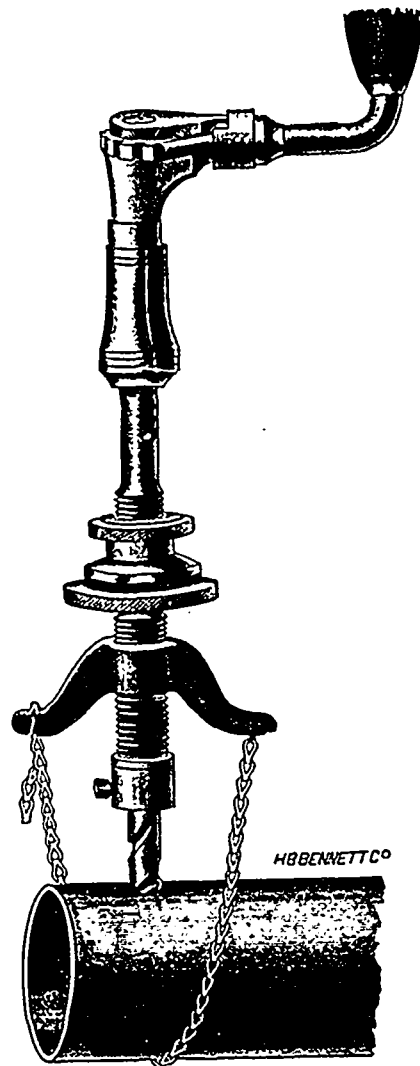
THE STREET RAILWAY CONVENTION.

The fourteenth convention of the American Street Railway Association, to be held in Montreal, October 15th to 18th, bids fair to be a very successful one. It is expected that about 700 delegates will be in attendance, and already a considerable number of firms manufacturing street railway appliances and equipments have expressed their intention to exhibit. The exhibition of new appliances and of railway equipments generally has been not the least interesting feature of previous conventions, and it is to be hoped that Canadian manufacturers in this line will come forward and show what they can do. The charge for space is 15 cents a square foot, the minimum space being 50 square feet, and the maximum 1,000 square feet to each exhibitor. Application for space cannot be guaranteed after 1st Aug., and exhibitors must take possession of their areas on or before Oct. 9th. A main shaft and electric power will be furnished to those who use power at 45 cts. per rated K.W., but exhibitors provide their own counter-shafts, pulleys, switch boards, etc. Those who wish to sell articles must get permission from the secretary. All goods should be plainly marked "Street Railway Exposition, Montreal, Canada," in shipping. Exhibitors will aid the management if they send a diagram of their exhibit, and its relation to the main shaft, and state the horse power required. The exhibition will be held in the Victoria Rink, and as the entrance to this building is too narrow to admit a street car, Mr. Cunningham, of the Montreal Street Railway, is endeavoring to arrange with the city for a temporary track in front of the rink, where street cars can be shown. The company will also take charge of cars sent for exhibition and run them over their lines during the convention, no objection being made to placards, streamers or banners announcing the manufacturer's name, and any special features of the cars. At the last convention held in Atlanta, Ga., in 1894, more than half the cars in operation in the city were motors and trailers sent in from various quarters for exhibition. The general secretary for the United States is John N. Partridge, president of the Brooklyn City and Newtown R. R. Co., Brooklyn, N.Y., and the local secretary in Canada is Stonewall Jackson, 27 St. Sacramento St., Montreal.

THE working of the Intramural Electric Railway at the World's Fair seems to have paved the way for a general change from steam to electricity in the motive power of the various railway corporations doing business in and around Chicago. The Metropolitan Construction Co. there have made what seems to be a highly satisfactory test of electric power, and now the Lake Elevated Railway Co. of the same city have ordered from the General Electric Co. twenty-five motor cars to replace their steam locomotives.

Now that the value of gypsum has come to be more fully recognized, and new uses which will largely increase the demand for it have been discovered, the people of British Columbia have begun to recognize the vast value of the gypsum fields in their Province. A dispute is, however, going on between the Dominion Government and the Government of the Province. The Dominion Government contends that gypsum is not entitled to be classed with minerals, and the production of it belongs to the Federal and not to the Dominion Government. Gypsum is now being extensively used as a deodorizer for stables and as a partial fertilizer.

Nova Scotia exports large quantities of gypsum in its refined form, but the cost of transport is very high. It is expected that the transport of British Columbia gypsum would be cheaper. The most productive gypsum fields in British Columbia are in the vicinity of Grand Prairie. The report of a settlement of the dispute between the two Governments is premature.



THE NEW PATENT AUTOMATIC FEED DRILLER.

The driller illustrated herewith is being put on the Canadian market by Darling Bros., of Montreal, who introduce it as the only machine made that will drill automatically cast iron, steel, brass, etc. With an ordinary carpenter's brace it does the same work as a ratchet brace in about one-half the time. Every carpenter, millwright, plumber, machine shop, carriage manufacturer, etc., should have one. It will be found to be a great money and labor-saving device. For particulars address Darling Brothers, Reliance Works, 112 Queen Street, Montreal.

REVIEW OF BRITISH TRADE.

John Birch & Co., engineers and merchants, of Queen Street Place, London, Eng., send THE CANADIAN ENGINEER a comprehensive review of the outlook for British trade, from which we make the following extracts:

In 1870 and 1871, in 1879, and again in 1888 and 1889, we had those brief periods of intense trade activity, and consequently prosperity which stand out sharply from the lean and lengthy periods intervening, during which the fat kine were devoured by their famished relatives. Hardly another lustrum has since passed with all its attributes of excessive competition and suffering, and its stern economic teachings, and now there are signs, which it is not possible to disregard, that the dawn of brighter days is possibly at hand.

The first condition invariably precedent to improvement is that prices should have come down to the lowest point. That this touching of rock bottom has been arrived at is not, of course, certain, but it is noteworthy that, despite the intensity of competition

during the last year or two, prices have scarcely fluctuated in those barometers of commerce, the steel and iron trades.

No 3 Cleveland pig iron in January, 1894, was..	£1	16	6
To-day it is..	1	15	3
G.M.B. Scotch pig iron in January, 1894, was..	2	4	9
To-day it is..	2	4	3
Steel rails in January, 1894, were..	3	15	0
To day are..	3	12	6
Steel plates in January, 1894, were..	5	5	5
To-day are..	5	0	0
Crown iron bars in January, 1894, were..	5	12	6
To-day are..	5	7	6

We seem to see, then, that the bottom of the curve has been reached, and that the gradient should soon commence to ascend. We find stocks are everywhere depleted, and not only must warehouses abroad be refilled and worn out plant be replaced, but new enterprises spring into birth. That the time has arrived for this last we may fairly judge from the numerous new companies which, during the past six months, have been successfully floated. That long locked-up capital has commenced to be again employed is evidenced by the activity of the stock exchanges and foreign bourses. But no doubt the most significant symptom of the approach of golden days is to be found in the constantly increasing output and storage of the standard metal.

About half a century ago men were galvanized by the discovery of the California gold field, the greatest that the modern world had seen. The rapid development of these "placers," or alluvial deposits, soon led to the most remarkable and universal outburst of commercial and manufacturing activity ever known, and a period of abnormal prosperity supervened. Following on that period the supply of gold gradually became less and less adequate for the requirements of the vastly increased trade of the nations, and has culminated during the last decade in absolute insufficiency, thus producing instability of rates of exchange between the gold standard countries and those using less precious metal.

But during the same period the discovery has been made of another gold field, to which that of California even is not comparable. In 1892, Mr. Hamilton Smith, the well-known mining engineer, after a visit to the Witwatersrand district of South Africa, pronounced the remarkable opinion which he was forced to arrive at, viz., that taking only into consideration the existing mines, all working at depths near, or comparatively near, to the surface, and entirely excluding from the field of view the possibilities of the deeper levels which are now being developed, there was in sight a mass of gold ore which would before long overtop the enormous Californian production of some 300 millions of English sovereigns. And he further stated that some years before the close of this century the Witwatersrand fields alone would increase the yearly gold output of the entire world by over 50 per cent. How far that opinion is being justified will be seen by the following figures, showing the output of the Witwatersrand, viz.:

In 1887.....	34,897 ounces.
" 1888.....	230,917 "
" 1889.....	379,733 "
" 1890.....	494,801 "
" 1891.....	729,213 "
" 1892.....	1,210,903 "
" 1893.....	1,478,473 "
" 1894.....	2,024,159 "

and during the first four months of the current year it has been 718,026 ounces.

But the tale does not end there, for in India, in Tasmania, in New Zealand, in Western Australia, in British Guiana, as also in the newer districts of South Africa, such as Matabeleland, Mashonaland and Zululand, other fields have been discovered, and are being, or are to be, vigorously worked.

Just before the discovery of the California field the world's output was about £6,000,000, which, in the short space of a few years, was increased to £30,000,000 per annum, after which it decreased gradually, until about twelve years ago it dropped to under £20,000,000. Since the Rand fields were opened, some eight years ago, the amount has steadily increased, until last year it amounted to about £36,000,000. Up to the present this increase has been absorbed in making up the deficiency in bare working requirements of specie which existed; but now it is certain that the vast annual sum, which is yearly being increased, and which will continue to increase during a far longer period in the future than was the case in the fifties, will have a much greater effect than that of merely filling up the deficiencies of the past.

It is true that the century approaches its close in a perfect ferment of confused opinions. Everything seems to have been cast

into the melting-pot; all the old social, political, religious and economical principles and traditions are being re-melted, and into what forms they will crystallize again we know not.

Such a period of unrest possesses many dangers, and when we add the racial antagonisms, which have become once more so keen and rancorous, it cannot be foreseen what resulting wars and social convulsions may occur, such as must baffle all calculations as to the spread of prosperity and the development of commerce, requiring, as these do, a state of peace for their fulfilment. At the present moment, however, it is rather a case of

"I dare not waiting on I would, like the poor cat 'i the adage."

"And the nations do but murmur, snarling at each other's heels."

One menace to peace has just been removed in the close of the war in the East, and, as the sovereigns of Europe appear to be sincerely desirous of maintaining the *status quo*, we do not know that we have to seriously apprehend any unfavorable change at present—though the danger, when it does come, may be expected from the more democratic form of governments, which are so susceptible to the influence of popular opinion and its passions.

While on the subject of politics it may not be inopportune to remark on the fact that the people of this country have now thoroughly realized that it is an absolutely vital necessity for England to be supreme on the seas, and there is probably no factor making for the peace of the world more important and more conducive to its maintenance than this one. But an effect perhaps more germane to the drift of our argument is that as in 1887-8 the very large number of vessels ordered to be constructed by our Government under the last Naval Defence Act, contributed materially towards the improvement in the iron and steel trades which then took place, so now also the vast sums authorized by Parliament for construction of war vessels, for building new docks and harbors, and for fortifying coaling stations, must have a similar effect.

An impression prevails very widely that the remarkable and complete success attending the Japanese arms will have the effect of causing China to awake from her lethargy, and to rapidly adopt the civilized methods which have so greatly contributed to the victory of Japan, and that consequently an era of immense enterprise will forthwith commence in China to the great advantage of European manufacturers. All things are possible of course, nevertheless the above assumption is based on a strange ignorance of the Chinese character, and the difficulties attending the leavening of a huge and inchoate empire of diverse races and tongues, as compared with the waking up the race which inhabits the small, compact and homogeneous islands of Japan.

For our part, we anticipate far more from the trade point of view from the rapid opening out of Africa by the Caucasian race, than from the march of China on a new and distasteful path, from which, at first, the makers of arms and warlike appliances have most to gain.

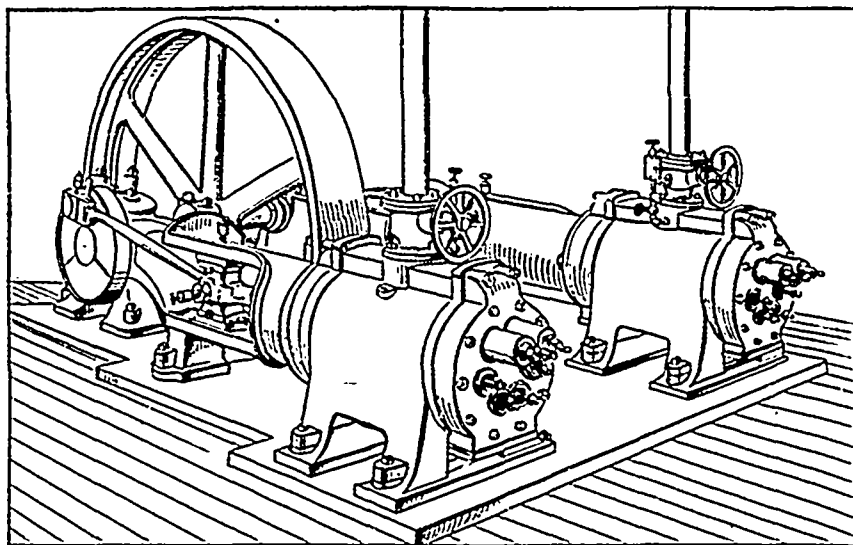
While this country maintains that military supremacy of the ocean which is its life blood, and is able to command all trade routes with its fleets and cruisers, so long will the bulk of the carrying trade of the world fall to its merchant service. Nor do we believe that our manufacturers and our artisans have been slow to recognize the lessons of competition, and, while showing far more adaptability than before to the special requirements of their customers, will still maintain their unrivalled powers of doing high-class work, and of producing more in a given time than any others. England opens her doors wide open to the free entry of the products of other countries, consequently her sons can buy their wants and live more cheaply than any other race in Europe—and cheap living means cheap producing.

By means of bounties and other governmental assistance, by specially reduced railway rates, and by countervailing duties, German manufacturers have wrested during past years some of our trades from us, but the nation pays for the privilege of the few, and in Germany the burden of taxation is more intolerable even than in France, as evidenced by the steady flow of emigration. And the result is that English manufacturers, enjoying all the advantages of geographical position, of cheap coal and iron ore, of short railway carriage to numerous ports, of the finest class of labor in the world, of free import of raw material, and of a powerful finance, have been put on their mettle, and are even now re-securing the trades they had partially lost.

Trade between countries is, after all, only a form of barter, and no country can long stand any drain of its specie, therefore, England must pay for her imports with her exports, and it stands to reason that distant countries must naturally purchase the products of a country which is the best and largest buyer of the exports from their own, and which, moreover, can ensure them the most rapid, regular and economical transport.

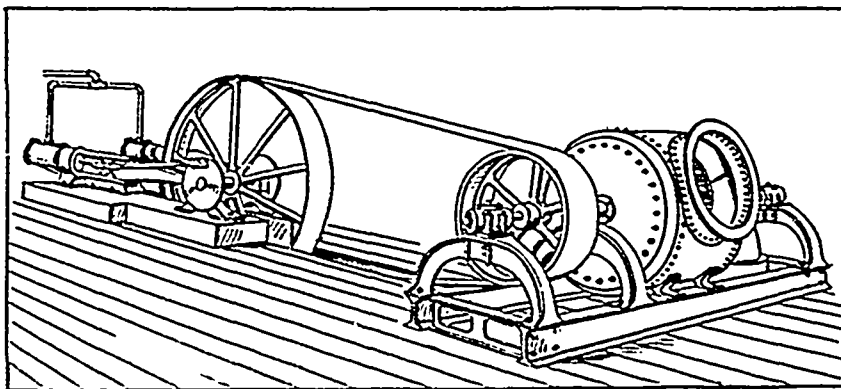
DUPLEX BELT POWER AIR COMPRESOR.

The illustration in this article shows a Duplex Belt Driven Air Compressor recently constructed by the Canadian Rand Drill Co., of Sherbrooke, P.Q., and in connection with the same is shown a new method of driving such compressors recently originated by the Rand Drill Co. The illustration showing the system of driving is almost self-explanatory, and it will be seen at once that it employs the system of turbine construction by which the wheel is placed upon a horizontal shaft. This construction of turbine is becoming extremely popular in the United States for nearly all power purposes, as in many cases it avoids a large amount of transmission gearing, and brings the wheel above the floor level, where it is extremely accessible. These advantages are apparent from the second illustration.



DUPLEX BELT DRIVEN COMPRESSOR.

Wherever the head of water is sufficient, the Canadian Rand Drill Co. prefer their system of driving, by which a Pelton water wheel specially adapted to the water fall being utilized, is mounted directly upon the crank shaft of the compressor, thereby making a water power compressor of the simplest possible construction. That system is not, however, of universal applicability, as in many cases the head of water is not sufficient to suit it, and in such cases the construction here shown is adopted.



DUPLEX COMPRESSOR WITH SPECIAL TURBINE.

The compressors are of the most substantial construction, contain all the latest improvements, and are designed especially with a view to satisfactory service at points far removed from the place of manufacture, and with the indifferent attendance which must be depended upon as the only alternative in many such situations.

A new bronze, called Roma, has lately been introduced in France. It is said to be much superior to manganese bronze and phosphor bronze. It contains copper, phosphorus, tin, aluminum and manganese. Roma is a pale yellow, has a specific gravity of 8.5, and melts at a temperature of about 1,000° C. As it does not corrode in sea water, and is not magnetic, it is preferable to steel for the hulls of steamers. It is said to have shown a strength of 24½ tons per square inch for castings, 31 tons for forgings, and 35 tons for rolled metal; all of which is certainly very extraordinary. Possibly the cost of it is so high as to prevent its extended use.—*Engineer.*

Editor CANADIAN ENGINEER:

A TIDAL MOTOR—THE NEXT GREAT POWER MACHINE.

SIR,—I was living last winter on the Thames embankment in London, and just across the street from our windows was the river, ever alternating between flood and ebb—high and low tide. It bore on its bosom great barges and scows, full freighted with coal, now quite up level with the pavement, their hulls standing even above the roadway, and again sunk down into what almost seemed like an abyss, for at London the tide rises and falls at least 14 feet. To lift a loaded steamship, weighing, with its freight, perhaps 20,000 tons, was as easy to this monstrous power as to float a fallen leaf. I came to feel towards the river as if it were a thing endowed with life—an awful Titan—a weird being pulsating twice every twenty-four hours—lifting and lowering—now swelling, now shrinking—rising to the street level and falling again—intermitting and reversing its action like an engine. The query continually rose to my mind, Why is this illimitable power not harnessed to work for man? As I am but a layman, will you not explain to me why the alternations of the tides cannot be economically profited by?

Is it not possible to have vessels of convenient weight to handle, say 1,000 tons, lifted by the tide 14 feet, and perhaps at that altitude shifted on to a railroad track; these weights in falling to be used to work machinery to develop electricity, which could then be distributed widely, as at Niagara, to produce power, light and heat? Thus the great smoke nuisance of London would be abated, coal mining and transportation diminished, the danger of conflagrations from coal fires and petroleum lamps minimized, and insurance reduced to its lowest terms. Can water be clarified by electricity?

Certainly, it is in the direction of these now wasting powers being brought to serve mankind that inventors should seek. Take the phosphorescent light of a fire-fly as an example; this little insect (a large proportion of whose machinery and energy must be employed in flying), can give a light which can be seen high up in the trees, 150 feet away (perhaps, indeed, 150 yards away) What cheap capacity of illumination Nature gives it! Yet, till Tesla (see *April Century*), no one seems to have given themselves to "catching on" to the fire-fly, or the glow worm that gilds the evening flower, or the animalcule that make the ocean brilliant. It may seem to chase an *ignis fatuus* to follow such a Will-o'-the-Wisp as the fire-fly or a tidal motor; but there was a practical dreamer all the same, who saw a dissipated puff of steam lifting a humble tea kettle lid; and I am now striding across 3,000 miles of water, as poor Peter could not do, on what is but a magnified and glorified tea kettle, an old iron pot "shaped like a whale," "backed like a weasel," and forced along by a watery cloud, which working a little screw that is infinitesimal compared with the ponderous ten or twenty thousand ton mass it shoves along by pushing a blade against a substance as soft, unstable and yielding as water. We have, as yet, only taken a few pieces of Nature's machinery out of her unlimited store to make them serve us—let us grope till we get a tidal motor.

Will you not do something to stimulate the search for an economical method of harnessing up the tides, help hunt for the bit and bridle to put in the mouth of this, as yet, untamed leviathan? I suppose the first thing to do is to write up a bibliography of the subject, and give a resumé of what has been successfully and what unsuccessfully attempted. The next step, after publishing these results, would be to offer a prize for the best essays on the topic. Will you not through your paper organize "The Tidal Motor Search Expedition?"

Napoleon, desiring to injure the British, offered a prize for the discovery of a plant grown in France from which to extract sugar. This resulted in the beet root sugar industry.

If the nations having territory on tidal waters, or even one of them, would offer a prize for an economical tidal motor, we might depend upon having some successful method of utilizing the tidal power.

In that case we should have the paper crowded with such advertisements as this:—

"The New Brunswick Tidal Motor Co. have now placed their **EFREET POTS** on the market. The quart size has stored up in it enough power to do the wash of a family of eight persons and costs only 10 cents. Attached to a revolving sweeper it will sweep a ten-room house every day for a month. It can also be applied to scrubbers, and if attached to blacking brushes, will polish two pairs of shoes daily for a year."

To the Agricultural Community:

The N. B. Tidal Motor Co.'s **Efreet Pots** will do a day's ploughing of two horses. Half gallon size 20 cents. It can also be applied to road vehicles, and instead of wearied horses we shall have tireless carriages. Half gallon size will drive a wagon 7 miles an hour for 10 hours."

HORACE J. SMITH.

On board S.S. "Britannic."

[The name "Efreet" is taken from the Arabian Nights stories, one of which tells of a fisherman finding a copper vase sealed with Solomon's seal; on opening it an obedient slave, an *Efreet* came forth, who served the bidding of the fisherman. We may add that an enterprising Nova Scotian informs us he is now carrying out experiments with a view to utilizing the enormous tides of the Bay of Fundy, which rise and fall in some places 40 to 60 ft., and which would produce a colossal power if it could be controlled without too much loss. THE CANADIAN ENGINEER will be proud to do its share to immortalize the name of any one who will construct a practical tidal motor, and will open its columns to contributions on the subject.—EDITOR.]

MICA BOILER COVERING.

Elsewhere will be found the advertisement of a new Canadian enterprise which bids fair to become an important industry. "The Mica Boiler Covering Company," which was incorporated in February of the present year, with headquarters at Toronto, was organized by a number of prominent Torontonians to acquire and work the patent rights granted for the manufacture of mica for boiler and steam pipe covering, cold storage insulators, fire-proof linings for safes, etc. Mica of course has long been recognized as among the most perfect of electrical insulators, if indeed it is not the best, but it is only now that it has been successfully adapted as an insulator of steam heat. Many attempts have been made to incorporate it with other non-conducting materials as a boiler covering, but it was only when it was used entirely by itself and unmixed with other foreign material that its extraordinary qualities were discovered. The covering as manufactured by the Mica Boiler Covering Co., and shown at their temporary premises at 2 Bay street, resembles a mat or mattress $1\frac{1}{2}$ inches thick, with a lining on either side of galvanized wire netting, and on the outer with canvas. The mica, in an infinite number of flakes or films as thin as tissue, is sewn through and through to the wire and canvas with stout brass wire stitches from four to five inches apart. When completed, these mats, which can be made of almost any size or shape, form a perfectly flexible fireproof jacket, which besides its wonderful non-conducting qualities, is easily applied and as easily and quickly removed without injury. Experts claim this latter to be a very valuable feature, as it is often necessary to inspect the shell of the boiler or pipe, which in most cases cannot be done without destroying the covering, and in no cases without considerable loss and difficulty.

The following reports on the non-conducting qualities of the new covering, made by such a well known authority as G. C. Robb, chief engineer of the Boiler Inspection and Insurance Co. of Canada is important evidence of the value of the invention:

46 KING ST. W., TORONTO, 25th June, 1895.

The Manager Mica Boiler Covering Co., Toronto.

DEAR SIR,—The following is a result of a test made to-day of several boiler coverings. Five vessels of same dimensions and in as nearly as possible same circumstances had steam turned on and kept on for two hours, at pressure ranging from 55 lbs. to 60 lbs. per square inch.

The temperature of room was 90 degrees Fah.

The amount of water condensed was in:—

No 1—Covered with wood and air space.....	5 $\frac{1}{4}$ lbs.
" 2— " mica boiler covering.....	3 $\frac{1}{4}$ "
" 3— " magnesia boiler covering..	4 $\frac{1}{4}$ "
" 4— " asbestos cement	10 $\frac{1}{4}$ "
" 5—No covering	21 "

Of the amount lost by having no covering:—

The wood covering saved.....	72.6 per cent.
" mica covering saved	84.5 "

The magnesia covering saved 79.75 per cent.
" asbestos cement saved 51 "

The mica shows an absolute saving of 4.75 per cent. over the magnesia, and relatively is 23.5 per cent. better than magnesia; that is taking the magnesia as the standard, the mica covering will save 23.5 per cent. more than the magnesia covering.

Yours truly,

(Sgd.)

GEO. C. ROBB, Chief Engineer,

The Boiler Inspection and Insurance Co. of Canada.

TORONTO, July 2, 1895.

Manager Mica Boiler Covering Co., Toronto.

DEAR SIR,—On the 27th June, 1895, tests were made of the non-conducting value of boiler coverings in the following manner, and with the following results:

Five iron plate boilers were erected in a room and connected to steam pipe, and fitted with drain pipe, so that the amount of water condensed in each could be accurately determined.

Each boiler was of iron plate, and all were of same dimensions, and placed in same conditions. The surface exposed by each was 19 square feet. One was left bare, one was covered with asbestos cement, one with magnesia, one with mica, and one with wood and an air space, as is usual on locomotives.

Steam was turned on and pressures kept up for six hours ranging from 55 lbs. to 75 lbs. The temperature of the air in the room averaged 93 degrees.

The water was drawn off and weighed at intervals, and the following shows the amount of water taken from each per hour:—

The uncovered boiler gave	12.54 lb. per hour.
The asbestos cement cover	3.98 lb. "
The wood cover	2.83 lb. "
The magnesia cover	1.85 lb. "
The mica cover	1.39 lb. "

With one hundred square feet of surface and one hundred hours of time, the saving effected by the mica covering would be 5,870 lb. weight of water in the form of steam; and allowing 8 lbs. of water evaporated per pound of coal, the saving in coal would be 733 $\frac{1}{2}$ lbs.

With a lower temperature in the room and a higher steam pressure the saving would be even greater.

The mica covering was the best non-conductor of those tried.

Heat and dampness do not seem to affect it, and vibration cannot disintegrate it, or cause the material to change its position.

The mica covering can be removed without injury to it, and replaced as often as may be necessary.

Its non-conducting property, its durability, and its portability unite in making it the most effective and convenient boiler covering on the market.

Yours truly,

(Sgd.) GEO. C. ROBB, Chief Engineer,

The Boiler Inspection Insurance Co. of Canada.

"Magnesia," "asbestos," and wood lagging were selected to test with "mica" as being probably the best known coverings hitherto in use. Other materials used on steam pipes, but not suitable for marine or locomotive work, are used, but the Mica Co. considered it fairer to test those coverings with which it was likely to compete in all fields of work. The management already report most encouraging progress. The new covering has been tried with great success by such corporations as the Toronto Street Railway, Niagara Navigation Co. (steamers "Chicora" and "Cibola,"), Toronto Ferry Co., etc.

With regard to cost, it is satisfactory to learn that under a new process, the sole rights of which are controlled by the Mica Boiler Covering Co., the scrap mica is manufactured at a price which will enable the covering to be sold at a figure well within the means of every steam user.

MONTREAL PROVINCIAL EXHIBITION.

The fourth Quebec Provincial Exhibition will be held this year in Montreal from the 12th to 21st September.

From present indications there is every prospect of the forthcoming exhibition being more successful than its predecessors. Many prominent firms have signified their intention of exhibiting this year, and an encouraging feature is the fact that a number of gentlemen have voluntarily offered gold medals and money prizes to induce competition. The various committees have completed the revision of the different departments of the prize list, which will be issued very shortly.

Extra premiums are offered to the syndicates and inspectors of butter and cheese factories. The machinery and industrial departments have been carefully reorganized. There will be no charge for entry, space or power in the machinery departments, and the

exhibitors of agricultural implements will be permitted to provide power to suit their own requirements, as at the Toronto and other exhibitions. The management trust that manufacturers in the province will determine to assist their own exhibition by coming forward with a fine display of the material they produce, and show to the farmers and people generally the value and character of their respective products.

A pleasing feature in connection with the Horticultural Department will be the competition by the pupils of the various city schools. Mr. Roy, the superintendent of the Mount Royal Cemetery, has supplied a special bulb to each pupil desiring to compete, and the best specimens shown will be awarded prizes. About 1,200 bulbs were given away this spring. R. Beullac, the well-known decorator, is arranging to have a grand historical museum, and from his thorough knowledge of artistic details and elaborate designs the public may anticipate a thorough treat. There will be an excellent programme of music and attractions provided, and the citizens and public generally may evidently look forward to a very superior exhibition. This year, for the first time in the history of Montreal exhibitions, there will be an excellent street car service direct to the grounds.

ANTIQUITY OF WIRE.

The manufacture of wire is of very ancient origin. It has been traced back to the earliest Egyptian history. Specimens are in existence which can be proven to date to 1700 B.C. The Kensington Museum has a specimen which was made in Minera, 800 years B.C. Ancient literature contains many references to wire. From the ruins of Herculaneum metal heads have been exhumed on which the hair is represented by wire. There is no question that this ancient wire was made by hammering out the metal, which was always bronze or of the precious group. This held true of all made previous to the fourteenth century, during which the process of forming wire by drawing or elongating the metal by forcing it through a conical orifice, made in some substance harder than the metal treated, was invented. It is not until this time that we have any evidence of iron having been used. At first this drawing was by hand power, and it continued so until the latter half of the century, when a German, named Rudolf, built some kind of a power mill in Nuremberg. About 1500 this industry was introduced in France by one Richard Archal. A half century later Queen Elizabeth, of England, granted permission to some Saxons to establish power wire drawing in her domains. Their first mill was driven by water power, and was located at Holywell. But for some time before this hand-drawn wire had been made in England. Pre-American ideas seem to have belonged to the business, as in 1630 Charles I. by royal proclamation, prohibited further importation of wire, because the home supply was sufficient both in quantity and quality. This must have given some encouragement to the "infant industry," as we are told that thirty-three years later the first really mechanical wire mill was built in England, at Sheen. Protected inventive genius had asserted itself. Germany had been the first to develop power drawing, and did not remain idle. In fact, that country, Belgium and England have practically been the only European nations in which the wire industry has flourished. For years after its introduction into this country we depended upon them for our main supply of both billets and rods.—R. W. HUNT, in *Cassier's Magazine*.

MINERAL PRODUCTION OF THE UNITED STATES.

The following statistics of the mineral production of the United States for 1894 have been compiled by Richard P. Rothwell, and published in the *Engineering and Mining Journal*, New York. The item of bituminous coal includes brown lignite coal. Some of the items given in round numbers are estimates.

There was a general decline in production compared with the previous year, the total value for 1893 being \$232,370,022. There were, however, some exceptions, of which the following were the most noteworthy: Production in 1893 of Tripoli and infusorial earth, 1,351 tons, value \$25,625; talc and soapstone, 20,100 tons, \$366,825; asphalt, 3,490 tons, \$68,682; bituminous rock, 31,404 tons, \$114,752; borax, 9,199,000 lbs., \$689,925; bromine, 348,399 lbs., \$87,100; cobalt oxide, 3,894 lbs., \$5,452; copper sulphate, 54,000,000 lbs., \$1,822,500; chrome ore, 1,629 tons, \$16,000; feldspar, 17,000 tons, \$5,000; manganese ore, 9,150 tons, \$60,000; mica, ground, 679,000 lbs., \$29,522; mica, sheet, 6,500 lbs., \$5,478; monazite, 130,000 lbs., \$7,600; marls, 200,000 tons, \$540,000; pyrites, 95,000 tons, \$285,000; slate, other than roofing, 4,138,920 sq. ft., \$475,681; aluminum, 312,000 lbs., \$202,800; gold, 1,739,323 troy oz., \$35,955,000. By comparing the foregoing figures with items in the table the amount of the increase in 1894 will be seen:—

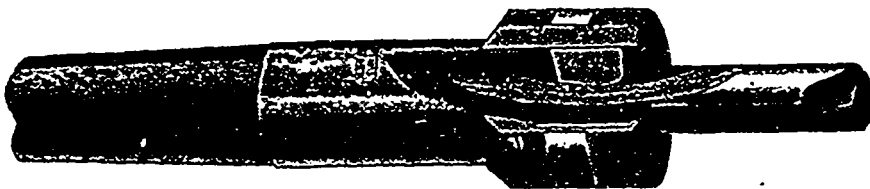
Products.	Customary measures.	Quantity.	Value at place of production.
NON-METALLIC.			
Abrasives—			
Corundum and emery	Short tons	1,220	\$109,500
Garnet	"	1,000	35,000
Grindstones	"	37,400	335,800
Millstones	"	297	4,447
Tripoli and infus. earth	"	1,802	36,687
Whetstones	"	1,735	84,450
Alum.	"	72,000	2,160,000
Antimony ore	"	165	9,075
Asbestos and Talc—			
Asbestos	"	250	3,750
Fibrous talc	"	39,600	396,000
Talc and soapstone	"	21,044	401,892
Asphalt	"	4,198	75,654
Bituminous rock	"	34,199	148,120
Barytes	"	23,758	95,032
Bauxite	Long tons	10,732	42,928
Borax	Pounds	13,140,589	919,841
Bromine	"	379,444	98,655
Cement, natural hydraulic	Bbls., 300 lbs.	7,895,259	4,397,407
Cement, Portland	"	738,196	1,080,644
Clay, refractory	Short tons	3,375,738	4,050,885
Clay, kaolin	"	24,552	185,169
Coal, anthracite	"	52,010,433	80,879,404
Coal, bituminous	"	117,950,348	103,842,467
Coke	"	8,495,295	12,654,558
Cobalt oxide	Pounds	6,550	8,843
Copperas	Short tons	14,897	104,100
Copper sulphate	Pounds	60,000,000	2,016,000
Chrome ore	Long tons	2,653	35,125
Feldspar	"	23,280	116,400
Fluorspar	Short tons	9,000	64,000
Graphite	Pounds	770,846	34,689
Graphite, amorphous	Short tons	165	1,252
Gypsum	"	287,517	849,925
Lime	Bbls., 200 lbs.	56,750,000	28,375,000
Magnesite	Short tons	1,370	4,864
Magnesia ore	Long tons	11,735	74,890
Mica, ground	Pounds	829,500	35,957
Mica, sheet	"	9,900	11,103
Monazite	"	750,000	45,000
Natural gas	"	.....	11,000,000
Paints, mineral	Short tons	38,801	€62,262
Paints, vermillion	"	41	45,600
Paints, white lead	"	87,242	8,445,174
Paints, zinc oxide	"	22,814	1,711,275
Petroleum (crude)	Bbls., 42 gals.	48,572,336	40,762,962
Phosphate rock	Long tons	952,155	2,856,465
Marls	"	225,000	607,500
Precious stones	"	.....	250,000
Pyrites	Long tons	107,462	466,466
Salt, evaporated	Bbls., 280 lbs.	9,161,053	4,608,275
Salt, rock	"	2,341,922	788,681
Salica, sand and quartz	Long tons	315,531	347,951
Slate, roofing	Squares	693,944	2,551,259
Slate, other manufactures	Square feet	5,099,791	499,578
Soda, natural	Short tons	.....	.....
Soda, natural sulphate	"	.....	.....
Stone, limestone (flux)	Long tons	3,544,393	2,126,636
Stone, marble	Cubic feet	5,681,766	2,177,280
Stone, onyx	"	1,450	29,000
Other building stones	"	.....	30,000,000
Total non-metals			353,760,877
METALS.			
Aluminum	Pounds	817,600	490,560
Antimony	Short tons	220	39,200
Copper	Pounds	353,504,314	33,540,489
Gold	Troy ounces	1,923,619	39,761,205
Iron, pig	Long tons	6,657,388	71,966,364
Lead, value at New York	Short tons	160,867	10,585,048
Nickel, fine	Pounds	.....	.....
Quicksilver	Flasks, 76½ lbs	30,440	1,095,840
Silver, commercial value	Troy ounces	49,846,875	31,403,531
Zinc spelter	Short tons	74,004	5,209,882
Total metals			\$194,092,119

ALUMINUM BATH TUBS AND SINKS.

There has lately been great interest taken in the manufacture of bath tubs from aluminum, also butler's sinks. These tubs are produced in two ways, one by casting and the other by joining sheet metal. It seems in each case to be a comparatively easy bit of work to form a bath tub, but until a very recent date all who had made the attempt secured considerable experience, but entirely unsatisfactory results. The honor of having been first to successfully make an aluminum bath tub, cast in one piece, belongs to a Philadelphia firm, who, after many trials, succeeded in casting a complete tub in green sand. The great size of the tub, which was but from one-quarter to one-half inch thick, in section caused an unusually severe shrinkage, which repeatedly ruined the casting and mold. By a clever arrangement of the gates and risers, and an adjustment of the shrinkage, perfect tubs were at last turned out. The castings were then ground smooth both inside and out, buffed all over and fitted with ornamental aluminum legs and other necessary attachments.

These tubs weigh from one hundred to one hundred and fifty pounds, according to the manner in which they are fitted up. The length inside is 5 feet $4\frac{1}{2}$ inches, depth inside is $22\frac{1}{2}$ inches, width inside 27 inches. In the line of sheet metal tubs, progress was impossible until a successful solder for aluminum was placed upon the market. Among the advantages that commend aluminum for use in bath tubs, the following physical characteristics are most prominent: Its heat conductivity is very high; the tub warms up and does not chill the water to the like extent of an iron or porcelain tub. It is light in weight, and admits of a high degree of finish. It will not discolor, tarnish, or corrode to the same extent as the baser metals. There is no coating or plating to wear off, thus eliminating the necessity of re-tinning. The aluminum may be buffed up at such time as it may be necessary, and the metal having its own body is thus practically imperishable. Exhaustive experiments demonstrated among other interesting data the fact that should water, after use of a bath, be allowed to remain in the tub over night, the surface of the aluminum is not affected, as is the universal case with ordinary bath tubs.—*Aluminum World*.

IMPROVED GRIP SOCKET.



SECTION CUT AWAY TO SHOW GRIP OF KEY ON THE SHANK.

The grip socket here illustrated is designed to hold and drive taper shank drills and other tools. A groove, which is the arc of a true circle, is milled in the shank of the drill or tool—as shown in above illustration; a key let into the body of the socket fits into the groove, and is locked securely in place by a turn of the revolving internally eccentrically counterbored collar.

After the key is locked it is impossible for the tool to slip in the socket, or to be pulled out, until the collar is turned back again to release the key. The end of the collar is beveled, and a plain index mark on it, and on the body of the socket shows when the key is released.



SOCKET READY FOR USE.

Drills or tools that have had the tange on the shanks twist off can be used in these grip sockets successfully, and in this way the cost of the sockets can be saved many times annually. Boring bars for under cutting can be used without any danger of their pulling out of the sockets, and the labor and expense of turning over heavy pieces saved.

This improved socket has just been patented by the Cleveland Twist Drill Company of Cleveland, Ohio, who are the sole manufacturers for the United States and Canada.

BOILER INSPECTION IN QUEBEC.

Owing to the doings of some self-appointed boiler inspectors in the Province of Quebec, the Boiler Inspection and Insurance Co. have issued the following notice to their patrons:

The Quebec Legislature requires that all steam boilers under the Factory Act shall be inspected once a year, and a certificate of the inspection be given to the Factory Inspector.

Provision is made by another Act for the giving of certificates of competency to qualified men to act as inspectors of boilers. All the inspectors of the Boiler Inspection and Insurance Co., in Quebec, are qualified inspectors and hold certificates as called for by Act of Parliament. No boiler inspector has power under the Act to insist upon any boiler owner allowing him to inspect a boiler. The owner has the right to select any one of the certificated inspectors to make the inspection, and also to select his own time for doing it. The Act merely requires that each year a certificate of inspection shall be given to the Factory Inspector; and if anyone has the right to order a manufacturer to have his boiler inspected it is the Factory Inspector, and not a boiler inspector. If any boiler inspector claims that he has authority to order your establishment to be closed in order that he may inspect the boilers, he is exceeding the privilege given him by his certificate, and should be reported to the Department of Public Works at Quebec.

STATIONARY ENGINEERS.

Montreal Branch No. 1, Canadian Association of Stationary Engineers, held a meeting in the Engineers' Hall on Thursday evening, June 20th. After considerable routine business had been transacted, the annual election of officers was proceeded with. The elections occupied the members until a late hour. The result was as follows: President, J. J. York. Bro. York was elected by acclamation, and despite his objections the members would not take a refusal. John Murphy was elected first vice-president; second vice-president's office was very closely contested, and resulted in favor of W. Ware. B. A. York was then elected secretary. T. Ryan was re-elected treasurer by acclamation amid much applause. H. Nuttal was re-elected financial secretary by a standing vote. Corresponding secretary W. H. Thompson was elected by a large majority; conductor, P. J. Moore, re-elected; doorkeeper, W. McAlpin; trustees, J. H. Garth, Geo. Hunt, J. G. Robertson.

At the last regular meeting of the Hamilton Branch C.A.S.E., held June 21st, the following officers were elected for the ensuing term: E. C. Johnson, president; W. R. Cornish, vice-president; Wm. Norris, corresponding secretary, re-elected by acclamation; A. Nash, financial secretary, re-elected by acclamation; Wm. Nash, treasurer, re-elected by acclamation; Wm. Jones, conductor; A. Vallick, doorkeeper, elected by acclamation; P. Stott, R. Mackie, R. C. Pettigrew, trustees. Hamilton No. 2 is getting along very nicely, considering the hot weather, which makes the boys shy in working out many problems. The address of the new president is 51 McNab street north; that of the corresponding secretary, 211 Wellington street north.

The following officers were elected for Toronto Branch, No. 1, C.A.S.E., at the annual meeting last month:—President, W. Lewis; vice-president, S. Thompson; recording secretary, T. Eversfield; financial secretary, W. Butler; treasurer, A. M. Wickens; conductor, M. Mose; doorkeeper, A. Slute; trustees, E. J. Philip, G. Fowler, — Hugget; delegates for convention in Ottawa, J. Fox, — Hugget, A. M. Wickens. The past president is E. J. Philip.

The following are the officers of Kingston Branch, No. 10, C.A.S.E., elected for 1895 at their annual meeting last month:—President, Sanford Donnelly; vice-president, Henry Hopkins; secretary, John W. Tandvin; treasurer, Charles Selby; doorkeeper, John Orr; conductor, John Gascoigne. The officers were duly installed by past president Robert King, on Tuesday evening, July 2nd.

The following is a list of officers of Brantford Association No. 4, C.A.S.E.: F. Lane, president; T. Pilgrim, vice-president; Jos. Ogle, secretary; L. Fordham, treasurer; W. Cowherd, conductor; A. McKinnon, doorkeeper. Trustees, Bros. Walker, Ames and Pilgrim.

The following circular has been issued by President John J. York to the friends of Montreal No. 1, C.A.S.E.: The members of the Montreal branch of this association, desirous of keeping abreast of the times, have decided to establish a library of scien-

tific works and books of reference pertaining to steam and electrical engineering, and to provide some of the funds necessary for this praiseworthy object, will hold a picnic to Hudson on July 27th, via the Canadian Pacific Railway. We therefore respectfully request that you will kindly aid us in making this enterprise a financial success, as it goes without saying that the better informed an engineer is the more economically will his employer's plant be operated, and we are the only association of men in Canada who meet together and devote all our time and funds for the purpose of mutual education.

Brockville Branch No. 15, C.A.S.E., has elected the following officers, who were duly installed on July 2nd: President, W. F. Chapman; vice-president, Archie Franklin; recording secretary, Wm. Robinson; financial secretary, John McCaw; treasurer, John Grundy; conductor, W. S. Baverstock; doorkeeper, David G. Donovan; trustees, Earnest Carr, Fred Andrews and Edward Devine; delegate to convention, W. F. Chapman. Wm. Robinson, the new recording secretary, writes: Our association is getting along well, and is surmounting difficulties by way of discussion every time we meet. The weather is rather hot for our limited hall, but we mean business after it gets somewhat cooler.

Jas. H. Walker, Kincardine, reports as follows: Kincardine Branch No. 12, C. A. S. E., have elected the following officers for the ensuing year: Daniel Bennt, president; George Lighthall, vice-president; Andrew Scott, secretary; Percy C. Walker, treasurer; Ford H. Walker, conductor; James Carrel, doorkeeper.

The Montreal branch C. A. S. E. are busy making preparations for their annual picnic. Hudson, Que., is the place chosen and the date Saturday, July 27. A good prize list has been arranged, and the indications are that the outing will be a success.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

The American Institute of Electrical Engineers held their annual convention at Niagara, N. Y., from the 25th to the 28th of June. The choice of Niagara as the place of this year's meeting was very happy, and in addition to the valuable routine work accomplished the members spent a very successful holiday at the various sight-seeing places in the vicinity. The papers read before the institute were as follows: "Properties of Fuse Metals when Subjected to Short Circuits," by W. E. Harrington; "The Theory of General Alternating Current Transformer," by C. P. Steinmetz; "Location of Grounds in Armatures, Fields, etc.," by C. E. Clifford; "Compounding Dynamos for Armature Reaction," by Prof. E. Thomson; "Electric Power in Factories and Mills," by Prof. F. B. Crocker, V. B. Benedikt and A. F. Ormsbee; "Some Features of Alternating Current Systems," by C. P. Steinmetz; "Some Observations on a Direct Connected 300-k.w. Monocyclic Alternator," by Prof. D. C. Jackson and S. B. Fortenbaugh; "Cost of Steam Power," by Dr. C. E. Emery; "Cause of Death in Electric Shock," by Dr. A. M. Bleile; "Long Distance Transmission at 10,000 Volts," by G. H. Winslow; "Alternating Current Curves," by Dr. C. E. Emery; "Notes on the Reconstruction of a Small Central Station Plant," by F. L. Pope; "Existing Commercial Applications of Electrical Power from Niagara Falls," by W. L. R. Emmett; and the "Substitution of Steam in Railway Practice," by Dr. L. Duncan.

The officers of the institute are: President, Dr. L. Duncan; vice-presidents, W. A. Anthony, F. B. Crocker, J. Hamblet, M. J. Pupin, W. F. C. Hasson and A. S. Hibbard; secretary, R. W. Pope; treasurer, G. A. Hamilton. Among the Canadians present were C. B. Hunt, London, Ont.; T. Roseburg, Toronto; E. B. Merrill, Toronto; E. C. Briethaupt, Berlin, Ont.; Wm. Rntherford, Toronto, and A. A. Dion, Ottawa.

THE MINING CONVENTION.

The mining associations of Quebec, Ontario, and Nova Scotia held their annual convention at Quebec on June 27th and 28th. E. J. Flynn, Crown Lands Commissioner, acted as chairman. Among the papers read were the following:

- (a) "Phosphoric Acid in Agriculture," by F. T. Shutt, chief chemist, Dominion Experimental Farm, Ottawa.
- (b) "Canada—a Natural Manufacturing Centre for Fertilizers," by H. Wigglesworth, New York.
- (c) "Phosphate's Future," by Capt. R. C. Adams, Montreal.
- (d) "Recent Improvements in and the Application of Electrical Machinery to Mining," (illustrated), by W. F. Dean, of the Canadian General Electric Company, Montreal.

The convention was a most successful one, and the excursions made up to Lake St. John and the Saguenay were much enjoyed by the visiting mining men.

MINERAL PRODUCTION OF CANADA.

The following statement of the mineral production of Canada for the year 1894 has been issued by the Geological Department. These figures are subject to revision in a bulletin to be issued later on:—

Product.	Quantity (a).	Value.
<i>Metallic.</i>		
Copper (b)	8,481,685 lbs.	\$ 805,760
Gold (c).....	52,992 ozs.	054,451
Iron ore (d)	109,991 tons.	226,611
" chromic	2,115 "	36,946
Lead (e)	5,792,700 lbs.	188,262
Nickel (f).....	4,907,430 "	2,061,120
Platinum .....	.....	1,000
Silver (g)	649,586 ozs.	409,239
Total metallic .....	.....	\$4 683,389
<i>Non-Metallic.</i>		
Arsenic	7 tons.	\$ 420
Asbestos	7,630 "	470,825
Coal	3,853,235 "	8,447,329
Coke (h)	57,768 "	147,861
Fire clay	252 "	515
Grindstones	3,757 "	32,717
Gypsum	223,631 "	202,031
Limestone, flux	35,101 "	34,347
Lithographic stone.....	180 "	30,000
Manganese	74 "	4,180
*Mica .....	.....	50,000
Mineral water	511,460 galls.	95,040
Moulding sand.....	3,074 tons.	6,148
Natural gas (j).....	.....	313,754
Ochres	1,155 tons.	11,120
Petroleum (k)	829,104 bbls.	835,322
Phosphate (l)	7,290 tons.	43,940
Precious stones .....	.....	1,500
Pyrites	40,527 tons.	121,581
Salt	57,199 "	170,687
Soapstone.....	916 "	1,640
Whiting	500 bbls.	750
<i>Structural Materials.</i>		
*Bricks .....	.....	\$ 1,800,000
*Building stone .....	.....	1,200,000
Cement	107,327 bbls.	140,659
Flagstone	152,700 sq. ft.	5,298
Granite	16,392 tons.	109,936
*Lime .....	.....	900,000
Pottery .....	.....	113,874
Roofing cement	565 tons.	1,978
Sand and gravels (exports)	324,656 "	86,940
Sewer pipe .....	.....	250,325
Slate .....	.....	75,550
Terra-cotta (m) .....	.....	65,600
*Tiles .....	.....	200,000
Total non-metallic .....	.....	\$15,921,867
Total metallic .....	.....	4,683,389
Estimated value of mineral products not returned, largely structural materials and graphite.....	.....	294,744
1894. Total .....	.....	\$20,900,000
1893 " .....	.....	\$19,250,000
1892 " .....	.....	19,500,000
1891 " .....	.....	20,500,000
1890 " .....	.....	18,000,000
1889 " .....	.....	14,500,000
1888 " .....	.....	13,500,000
1887 " .....	.....	12,500,000
1886 " .....	.....	12,000,000
(a) Quantity marketed, except when otherwise specified. Tons are of 2,000 lbs.		
(b) Copper contents of ore, matte, etc., at 9½ cents per lb.		
(c) Nova Scotia and Ontario gold at \$19.50, Quebec at \$18, and British Columbia and Yukon at \$17 per oz.		
(d) Of this quantity 108,871 tons were converted into pig-iron, producing 49,967 tons, valued at the furnaces at \$646,447.		
(e) Lead contents of ore, etc., at 3¼ cents per lb.		
(f) Nickel contents of ore, matte, etc., at 42 cents per lb.		
(g) Silver contents of ore, etc., at 63 cents per oz.		

* Estimated.

- (h) Oven coke, all the production of Nova Scotia.
 (j) Gross return from sale of gas.
 (k) Calculated from inspection returns, at 100 galls. crude to 38 refined oil, and computed at \$1 00¼ per bbl of 35 imp galls. The barrel of refined oil is assumed to contain 42 imp. galls.
 (l) Railway shipments at average price of \$6 per ton.
 (m) Includes structural and ornamental terra-cotta

DEATH OF WARDEN KING.

The business community of Canada, and the citizens of Montreal more particularly, have to lament the death this month of Warden King, one of our best known manufacturers connected with the iron trade. Mr. King was born in Scotland and was 72 years old. He came to Montreal at 21 years of age, and at that advanced age apprenticed himself to a moulder in the old St. Mary's Foundry, in which his late partner, Geo. Rogers, was foreman for many years. After a time in the States, Mr. King returned to Montreal, and in 1852 joined Mr. Rogers in the purchase of the foundry business of the late Thos. Molson. After Mr. Rogers' death the business was continued in Craig street and developed steadily, till it has attained its present large dimensions, the furnaces, steam fittings, pipes,



THE LATE WARDEN KING.

etc., made by the firm of Warden King & Co. being known not only throughout the entire Dominion, but in the United States and Great Britain, where their goods are extensively sold. The active management of the business has of recent years devolved upon his son, James C. King, who, with two daughters, Mrs. James R. Lowden and Mrs. Daniel Yule, survive him.

Mr. King did not spend all his energy and business talent on his business, but gave much attention and no small amount of money to religious and philanthropic work. He was years treasurer of the Y.M.C.A., and one of his last acts was to present that institution with a valuable lot of land in the rear of their building. He was identified with the Montreal Presbyterian College from its beginning, and was seven years its treasurer. He gave largely and unostentatiously to missionary work, and to many churches outside his own congregation. As a friend of the writer remarked on hearing of his death, "He was a man of a stamp that the world can ill spare in these days."

REVIEW OF THE METAL TRADES.

MONTREAL, July 8th, 1895.

Since last month prices have stiffened up considerably in the English markets. Though advices have not been yet received, it is expected that tin plates will advance considerably during the coming week or two. Canada plates are firm at \$2.10 and are advancing on the English market. The metal implement trade is very quiet at present, as all farmers have bought their supplies. The following are current quotations.—Summerlee, \$19 50 to 20; Eglington, \$18 50. America, \$17.50 to 18. Cambroc, \$18.50; Ferrona, \$16 50 to 17. Seimens, No. 1, \$16 50 to 17; wrought scrap, No. 1, \$14.50 to 16; bar iron, \$1.60 to 1.65; tin plates, \$2.75; I. C. charcoal, \$3.25; Canada plates, \$2 10; terne plates, \$5.50 to 5.55; galvanized iron, 4 to 5c according to brand. Orford copper, 9¼ to 11c., ingot tin, 15½ to 16½c; lead at \$2.90 to 3. spelter, \$4; sheet zinc, \$4; cut nails, \$2.10; Black sheets, up to 16 gauge, \$1.75. 17 to 24 gauge, \$1.90. 26 gauge, \$2. 28 gauge, \$2 10.

SOME USEFUL FACTS.

WEIGHT OF IRON.

½ inch diameter	=	1 lb. per foot run.
¾ " "	=	2 " " "
1 ¼ " "	=	4 " " "
1 ½ " "	=	8 " " "
1 cubic inch of wrought iron	weighs	0.28 lbs
1 " " cast	" " "	0.26 "
400 " " wrought	" " "	1 cwt.
425 " " cast	" " "	1 "

WORKING STRENGTH OF ROPES, IN TONS.

Circum. in Inches.	Hemp		Wire	
	Common.	Good.	Iron.	Steel.
1	0.032	0.046	0.29	0.45
1½	0.072	0.104	0.65	1.05
2	0.128	0.184	1.16	1.80
2½	0.200	0.288	1.81	2.81
3	0.288	0.414	2.61	4.05
3½	0.392	0.564	3.53	5.51
3¾	0.450	0.647	4.08	6.35
4	0.512	0.736	4.64	7.20
4½	0.648	0.932	—	—
5	0.801	1.150	—	—

(From Baker and Farwell's Hanger.)

NEW METAL FIRM.

W. Jack and A. G. Robertson, of Montreal, have recently returned from the Continent, having been there on a business trip for some three months. Owing to the death of W. H. Meredith, the firm of Middleton & Meredith is now in liquidation, and the firm of Jack & Robertson have been appointed by the principals, who were recently represented by the late firm of Middleton & Meredith, as sole agents in Canada. They represent some of the leading manufacturers in England and the Continent, for railway supplies of all descriptions, telephone and telegraph supplies, and also for all classes of heavy hardware, such as copper sheets, tin plates, Canada plates, anvils and vices, galvanized iron, wire, lead, etc., etc. That Messrs Jack & Robertson have been accredited with all the agencies carried on by a firm so well known and highly esteemed as Middleton & Meredith, speaks well for the enterprise and business capacity of the new firm, to whom we extend our congratulations.

RECIPES FOR PROTECTING BRIGHT STEEL AND IRON.

A solution of india-rubber in benzine has been used for years as a coating for steel, iron and lead, and has been found a simple means of keeping them from oxidizing. It can be easily applied with a brush, and is easily rubbed off. It should be made about the consistency of cream.

Bright steel articles in a drawer can be perfectly preserved from rust by putting a lump of freshly-burnt lime in the drawer or case in which they are kept. If the things are to be moved—as a gun in its case, for instance—the lime should be put in a muslin bag. This is especially valuable for specimens of iron when fractured, for in a moderately dry place the lime will not require renewing for many years, as it is capable of absorbing a large amount of moisture. Articles in use should be placed in a box nearly filled with thoroughly slaked lime. Before using them rub well with a woolen cloth.

The following mixture forms an excellent brown coating for preventing iron and steel from rust: Dissolve two parts crystallized iron chloride, two antimony chloride, and one tannin in four of water, and apply with sponge or rag, and let dry. Then another coat of paint is applied, and again another if necessary, until the color becomes dark as desired. When dry it is washed with water, allowed to dry again, and the surface polished with boiled linseed oil. The antimony chloride must be as nearly neutral as possible.

To keep tools from rusting, take ½ oz. camphor, dissolve in 1 lb. melted lard, take off the scum, and mix in as much blacklead (graphite) as will give it an iron color. Clean the tools and smear with this mixture. After twenty four hours rub clean with a soft linen cloth. The tools will keep clean for months under ordinary circumstances.

Another plan is to take one quart freshly slaked lime, ½ lb. washing soda, ½ lb soft soap in a bucket, and sufficient water to cover the articles. Put in the tools as soon as possible after use and wipe them up next morning, or let them remain until wanted.

Another varnish adopted by some is made by mixing slowly together 6 ozs. or 8 ozs. lard to 1 oz. resin, stirring till cool. When it is semi-fluid, it is ready for use. If too thick, it may be further let down by coal oil or benzine. Rubbed on bright surfaces, ever so thinly, it preserves the polish effectually, and may be readily rubbed off.

A good protecting paste may also be made by slaking a piece of quicklime, with just enough water to cause it to crumble in a covered pot, and while hot adding tallow to it, and working into paste.

GLAZING CAST-IRON.

Cast-iron is a granular substance that will finish up with a surface full of minute pores or intersections that are formed among grains of the metal, and is quite useful just from this feature alone. A disk, when once filled with diamond dust and oil, makes one of the finest grinders for small tools and drills. In polishing glass a cast-iron surface will retain a particle of emery powder in every point of exposure, and only needs a good supply of water to keep it well lubricated. And in making journal boxes there is nothing better for light work, or where the load can be distributed over a larger surface than cast-iron, when once these minute intersections have become glazed over with the particles of iron itself. What is wanted is some wax to burnish down a cast-iron surface at the start, and have the bearings all ready to start off on a six months' work with only a meagre supply of oil.

RAILWAY TELEGRAPH SUPERINTENDENTS.

The annual convention of the Railway Telegraph Superintendents was opened in Montreal on June 12. There was a very large attendance of members, representing every part of the United States. On June 13th the delegates made a trip to Quebec, and a very enjoyable time was spent.

Among the subjects discussed at the convention were papers by T. D. Lockwood, of Boston, on "The causes and remedies for disturbing or interfering currents on telegraph and telephone circuits"; G. H. Thayer, "Trolley currents and automatic signals"; C. F. Annett, "Storage batteries in telegraph work"; C. A. Parker, "Line construction," and a number of others.

The election of officers resulted in M. B. Leonard, of Richmond, Va., being appointed president; J. W. Fortune, Detroit, Mich., vice-president, and P. W. Drew, of Milwaukee, re-elected secretary-treasurer.

It was decided that the next convention be held at Fortress Monroe, Va., on the third Wednesday in June, 1896.

LITERARY NOTICES.

The Electrical Journal is the title of the latest trade paper in the electrical field. It is published monthly by Geo. P. Low, in San Francisco, at \$1 a year, and the first number contains 30 pages of very interesting matter relating to electrical work, more especially the electrical progress of the Pacific coast.

The Imperial Trade Review is another new trade journal, issued in the great metropolis of the world, and devoted to the interests of British merchants and manufacturers. Its monthly reports of produce and raw materials generally will be found valuable to manufacturers and foreign buyers. Published at 30 Lime street, London E.C.; subscription 7s. 6d. per year.

The enterprising proprietors of the *American Artisan*, of Chicago, have produced something really novel in their little advertising booklet, "The Alphabet," which looks so dainty in its calico cover and carmine bordered pages.

The *Might Directory Co.*, of Toronto, the largest directory publishers in Canada, have just issued a handy business directory for the five leading cities of central Canada—Montreal, Toronto, Ottawa, Hamilton and London—giving in one volume all the businesses of these cities in classified form. The method of classification is very good, the revision of the lists well up to date, and the printing much better than is the case with the business directories we have been accustomed to see.

We have received the foreign edition of the catalogue of the Sheffield Car Co., of Three Rivers, Mich. It is printed in English, French, German and Spanish, and is neatly printed and illustrated. This company manufacture light cars for railway work, including trolley cars and hand cars for section men, railway velocipedes or three-wheeled cars in several styles, car wheels, etc.

We are in receipt of a pretty and useful blue print hanger issued by Messrs. Beker and Farewell of Temple Building, Montreal, an enterprising firm of mechanical engineers and draughtsmen. The

specialty of the firm is drawings and blue prints for machine shops, boiler makers, founders, model makers, plumbers, inventors, smiths, etc. And the hanger issued by them contains statistics and hints as to the weights of various thicknesses of iron, rules for finding areas and solidities, electrical notes, working strength of ropes, and a number of other items of particular use to mechanical engineers. Altogether the hanger is one of the most attractive, and is certainly the most useful adjunct to an engineer's office that has been issued for some time.

Industrial Notes.

ELKHORN, Man., is to have a grist mill.

It is probable that Walkerton, Ont., will build a \$10,000 town hall.

A COMPANY in Winnipeg is being organized to start a canning factory.

A NEW fruit canning factory has been started at St. Catharines, Ontario

AN extensive evaporating plant will be established at Owen Sound.

THE Wetmore sardine factory at Deer Island, N.B., has begun operations.

A NEW \$30,000 Roman Catholic Church is being built at Niagara Falls.

THE Kingsville, Ont., Preserving Company's plant has been sold for \$6,000.

THE grist mill at Pakenham, Ont., which was destroyed by fire, is being rebuilt.

W. JORDAN, late of Rat Portage, has started a box factory at Whitemouth, Man.

THE new buildings of the Guelph Rolling Mills are to be commenced within a few days.

THE Havelock Mineral Springs Company are about to rebuild their factory at Petitcodiac, N.B.

THE Toronto Radiator Co., Dundas street, Toronto, will spend \$5,000 in additions to their factory.

A BRIDGE is to be built over the Gatineau River at Maniwaki, Que. The bridge will probably be of steel.

T. BURNS' new sawmill at Kingston, N.B., was completely destroyed by fire a few days ago. No insurance.

ANDRE CUSHING & Co. will probably build a new steam sawmill, with box machinery, near Fredericton, N.B.

THREE years ago there was but one cheese factory in Prince Edward's Island; last year there were twenty-eight.

THE contract for building the new drill hall at Halifax, N.S., has been awarded to J. Askwith, the price being \$187,000.

ALBERT COLLEGE, Belleville, is having a brick and stone enlargement at a cost of \$20,000. Mr. Hanley is contractor.

THE new water system at Digby, N.S., is to be in operation next month. The water is brought from a hill three miles from the town.

THE Arnprior, Ont., *Watchman* is now printed by a one-horse tread mill. The outfit cost \$150, and 1,100 papers can be printed in an hour.

THE planing mill and machine shop belonging to J. Shurr, of Kohler, near Cayuga, Ont., has been destroyed by fire. Loss \$5,000. No insurance.

J. Y. SHANTZ has fitted up the old Dominion Button Works' building at Waterloo, Ont., as a factory for the manufacture of threshing machines.

THE lumber mill at New Sweden, Aroostook, N.B., owned by O. Iverson, was burned recently and all the machinery and stock destroyed. Loss \$10,000.

SEVERAL councillors of Westmount, near Montreal, are in favor of a special loan of \$100,000, to be spent in the construction of gas works for the municipality.

FARMER'S pork factory at Hamilton was burned recently. Loss \$19,550, as follows: Building, \$6,000; stock, \$8,050; machinery, \$5,500. It is being rebuilt.

THE Windsor salmon cannery on the Skeena River, near Victoria, B.C., has been totally destroyed by fire; loss \$40,000. The cannery was owned by the British Columbia Canning Company, of London, Eng.

A NEW steam saw mill is being erected at St. Tite, Que.

THE new Trinity Church and school at Port Hope will cost \$14,350.

SARNIA, ONT., is to spend \$18,765 on new pavements this summer.

It has cost the Dominion Government \$215,000 to survey Georgian Bay.

THE Lancaster, Ont., machine works are manufacturing some goods for Great Britain.

THE Tudhope Carriage Co., of Orillia, will erect a four story addition to their factory.

A \$60,000 brewery is talked of by St. Witteman & Hoffman, near Prince Albert, N.W.T.

WINDSOR, ONT., waterworks yielded a surplus of \$20,623.05 for the city treasury last year.

THE new match factory at Buckingham, Que., is now finished, and matches will be made this month.

THE Canada Pipe Foundry has secured the contract for pipes for the waterworks extension in Collingwood, Ont.

THE paper mill at Napanee Mills, Ont., will probably start work again soon, and manufacture wall papers only.

THE Rathbun Co., at Deseronto, Ont., are experimentally lining their furnaces with actinolite in place of firebrick.

A PRIVATE company is being organized to construct a waterworks system for Ottawa East, at a cost of about \$20,000.

A COMMITTEE of the Woodstock, Ont., town council has been authorized to engage an engineer to report on a sewerage system.

THE St. Lamberts, Que., school commissioners will build a school to accommodate 250 scholars. The details are not arranged yet.

THE British Columbia Iron Works at Vancouver has secured the contract for the equipment of the Slocan Tramway Company's lines.

THE employees of E. Leonard & Sons, London, Ont., foundry have had their wages increased 5 per cent. as a result of improved business.

MCGILL COLLEGE, Montreal, is to have a \$30,000 extension of the ladies' department. The money was donated by Sir Donald A. Smith.

THE Iroquois House, the large summer hotel at St. Hilaire, Que., which was burned last month, will not be rebuilt for the present.

W. L. PRINCE has the contract for building the new Baptist church at St. John, N.B. The price is \$16,000, exclusive of seating and heating.

BRADBURY & HURST, of Victoria, B.C. have secured the contract for the Nanaimo, B.C., court house, and will begin work immediately.

THE Hamilton Bridge Company have closed a contract for constructing a steel bridge 110 feet long over McGregor's Creek, Harwich, Ont.

JOHN GALT, C.E., of Toronto, has estimated that the new waterworks for Gravenhurst, Ont., will cost \$18,000, and the new electric light plant \$8,500.

THE Ontario Rolling Mills Company, Hamilton, Ont., has put in a puddling furnace with a capacity of four tons a day. It will use iron from Three Rivers.

RECENT amendments in the Ontario Factory Act require that the most secure guarding possible is to be used for protection against dangerous mill gearing, machinery, flumes, doors, bridges, etc.

VICTORIA, B.C., has fully decided to have a waterworks system, but feeling among the city councillors is running very high as to who shall receive the contract for the work. The cost will be about \$85,000.

G. GOODERHAM, of Toronto, has advanced \$100,000 to the Hamilton Iron and Steel Company, to be used in the completion of the smelting works. It is expected that the works will be in operation by the end of the year.

PATTERSON & CORBIN, manufacturers of street cars, at St. Catharines, Ont., are shipping two large merry-go-rounds, one for a Nova Scotia town, and the other to go to Walkerton, Ont. They have 56 seats each, including 24 rock horses, 16 chairs and 4 double seated chairs. The same firm have built two handsome cars for the St. Catharines and Thorold electric railway, and are doing considerable car repair work.

A NEW brewery is being erected at Brandon, Man.

THOROLD, Ont., is agitating for a waterworks system.

J. HODGSON is erecting a saw-mill at South Finch, Ont.

ROSSLAND, B.C., electors are agitating for a waterworks system.

WOODSTOCK, Ont., will soon vote on a by-law for a \$9,000 market shed.

A \$20,000 addition is being made to the Albert College, Belleville, Ont.

WORK on the projected pulp mill at Chatham, N.B., is to be commenced this month.

THE old Presbyterian Church at Oil Springs, Ont., has been converted into a foundry.

A COMPANY is being formed in Toronto to manufacture the Oliver typewriter in Canada.

J. AUBERTON'S saw mill and grist mill, East Hereford, Ont., were burned down on June 20th.

CARBERRY, Man., will vote on the question of raising \$11,000 to build a new school, on July 15th.

MISS MARGARET CARLYLE, of Toronto, has been appointed female inspector of factories in that city.

THE Toronto Litho Company has purchased a building lot for \$6,500, and will erect a handsome building.

THE new *Globe* building at Toronto will cost \$113,000, and will have a frontage on Yonge street of 54 feet.

THE Ried & Currie Iron Works, Westminster, B.C., have again resumed operations, with J. Peck as manager.

THE lowest tender for building the proposed Masonic temple in Winnipeg is for \$14,000, from Rourke & Cass.

GALT, Ont., town council is considering the advisability of laying of a sewerage system, to cost the town \$50,000.

A NEW grist mill is being built at Hillhurst near Compton, Que., in place of the one burned down a short time ago.

THE Dominion Bridge Co., of Montreal, have commenced the construction of the new iron bridge at Casselman, Ont.

THE water for the new waterworks at Hartland, N.B., is to be supplied from a reservoir with a capacity of 200,000 gallons.

PROUT'S lumber mill, at Oil Springs, Ont., which was destroyed by fire a couple of months ago, is now being rebuilt.

PURVES' steam saw mill, at Carleton, N.B., was destroyed by fire a few days ago. Damage, \$30,000. Insurance, \$8,000.

W. BRATTY & SONS, of Welland, Ont., are building a drill boat and other apparatus for the Montreal Harbor Commissioners.

BENNET, WRIGHT & CO., of Toronto, have been incorporated with a capital stock of \$93,000, to manufacture boilers, furnaces, etc.

THE Browne Mfg. Co., Montreal, selling agents for Leviathan Belting, have sold main belts to the Lachine Engine Co., and to Paul Galibert.

THEO. DOUST has got the contract for the Catholic college in the parish of Ste. Elizabeth, Notre Dame, West Montreal, the amount being \$70,000.

THE Dominion Government has granted \$6,500 for a wharf on Lake Winnipeg; \$10,000 for Rat Portage post-office; and \$5,000 for Prince Albert court house.

THE Amherst Boot and Shoe Mfg. Co. are building a power house and will put in a 40 horse-power Robb-Armstrong engine and Monarch Economic Boiler.

THE bridge across the Otonabee, at Rose's, Ont., will probably be constructed in the near future. The bridge will cost \$10,000. The money available amounts to \$7,000.

FREDERICTON, N.B., will vote this month on the question of a complete system of sewerage. A. G. Beckwith has been instructed to estimate the probable cost of the undertaking.

CONTRACTS for the erection of a steel bridge at St. Anne de la Perade, Que., have been awarded to Geo. Beaucage for masonry and the Imperial Bridge Co., of Montreal, for superstructure.

A COMPANY has asked Prescott, Ont., for freedom from taxation for ten years and a building site. If these privileges are granted to them they propose to build a \$50,000 flouring mill in that town.

THE St. John, N.B., *Sun* says: "The rolling mill business of J. Harris & Co., and the tack and nail works of S. R. Foster & Sons, have been amalgamated, and hereafter will be operated under the name of the Portland Rolling Mills Company, Ltd. J. C. Robertson is the president of the new company, S. Hayward the vice-president, and J. Mowat treasurer."

A new brewery at Brandon is to be built by Mr. Keller.

OAKVILLE, Ont., will probably install a \$1,500 waterworks in a short time.

PLANS and estimates are asked for a Y.M.C.A. building, at London, Ont.

A \$30,000 cold storage works has been put up in Westminster, B.C., by the Texas Lake Company.

THE Cape Breton boot and shoe factory at North Sydney, N.S., have decided to close up business.

THE B. C. Iron Works of Vancouver contemplate establishing a branch foundry and machine shop at Nelson, B.C.

THE Braeside, Ont., saw-mills of Gillies Bros. are now in operation, having had a new engine of 1,600 h.p. put in.

THE Toronto Steel Clad Bath Company will erect a brick addition to their factory, Queen street east, to cost \$4,700.

CONTRACTS for steel bridges over Salmon and Tusket Rivers have been made with the Central Bridge and Engineering Co., of Peterboro, Ont.

MAYOR AUBREY, of Hull, Ont., has had judgment rendered against him on charges of boodling, and has been fined \$983. His costs will be \$2,000.

NEW waterworks are being introduced into the municipality of Hedleyville, Que., the municipality corporation having borrowed \$55,000 for the purpose.

THE Dominion Government has granted the Pictou Foundry Company the contract for building fifteen iron buoys, to be delivered at St. John and Halifax.

THE Ottawa Saw Manufacturing Company, Ottawa, Ont., are about to add new machinery to their establishment for the purpose of manufacturing band saws.

ON July 1st a fire destroyed the sawmills and machinery of T & J. Taylor at Pleasant Grove, near Galt, Ont. There was no insurance. The mills will be rebuilt at once.

THE Montreal city hall is in a very unsanitary condition. The main drain is leaky in several places, and the whole ventilation system is defective. The repairs will cost \$53,200.

THE large tank at Wallaceburg glass works began to leak a few days ago and a large quantity of liquid glass escaped. The damage will delay the resumption of work until September.

ON the 7th inst. a fire started by children at play in Lorneville, a suburb of Cornwall, resulted in 50 houses being burned down. The inhabitants were chiefly employees of the cotton mills.

A MILL at Chiktehawk bridge, Bristol, N.B., which was destroyed by fire recently, has been leased by J. Giberson, and will be fitted up with the necessary machinery for a wood working business.

J. A. BRILL, of the Nova Scotia Development Co., on July 2nd made a contract in England for twenty-five miles of rails, and a contract with W. Taylor, of Salisbury, N.B., for sleepers for the same number of miles.

WOODSTOCK, N.B., has engaged W. R. Kinsey, of New York, to survey the town and report upon the best method of sewerage. Eight miles of sewerage will be required to drain the whole of the town, and the cost will be \$30,000.

Now that the city engineer of Toronto again reports the urgent need of a new intake pipe, etc., for the water system, the Georgian Bay Aqueduct Co. are once more before the city council. This time the company proposes to assume the entire city debt if they get a 50 years' contract.

H. T. HAZEN, C.E., has been surveying for a system of water power at Buckingham, Que. The power that could be developed from the Lievre River where it empties into the Ottawa is very large. From the village of Buckingham to the Ottawa there is a fall of 262½ feet in the Lievre, and Mr. Hazen has laid out fifteen water privileges in this distance—about five miles. These powers are owned by David and Alexander MacLaren, of Ottawa and Buckingham.

EXTENSIVE alterations are being made at the Jeffery asbestos mine near Danville, Que., now owned by Boas and Greenshields. The four light engines are being taken out and new machinery is being substituted. A five-story structure is being put up in which to manufacture the fibre; and a machine for crushing the rock instead of hand "cobbing." A 20,000 tons contract will keep the mine at work for two years, besides which the company are going to do their own asbestos material manufacturing. By the new mode of preparing the asbestos there will be a saving of 30 per cent. in the cost, and shortly there will be 500 men at work. At present there are 300.

CHARLES THACKERAY, the maker of the Thackeray inclinator, Montreal, has formed a company at Chicago to build eight of his garbage burners in that city.

CHANCELLOR BOYD, of Toronto, has decided that the city may assess the gas mains of the Consumers' Gas Co. This judgment will apply not only to Toronto, but all over the province.

A BICYCLE factory is to be started in Windsor, Ont. The plant is to be put in at once, but no bicycles will be put on the market this year. The factory will give employment to nearly 100 men.

THE Dominion Carriage and Wheel Manufacturing Co., St. Therese de Blainville, Que., have been incorporated with a capital stock of \$150,000, to manufacture carriage wheels, sewing machines, etc.

THE Belleville *Intelligencer* says: The Walker foundry firm is being changed into a joint stock company. W. Sutherland and G. Gordon, of Deseronto, will become active members of the new company.

SUPERINTENDENT HAGGAS, of the Toronto Junction waterworks, has laid an information against Byron Crandell, late engineer in the pumping station, charging him with forging his Haggas' name to a testimonial as an engineer.

THE R. A. McCready Company, of Toronto, Ltd., directors—R. A. McCready, J. G. McCready, both of Toronto, and E. C. Graves, of St. Catharines, has been formed to manufacture and sell bicycles and bicycle supplies. Capital, \$25,000.

THE Brunette sawmills, near New Westminster, B.C., have been burned, at a loss of \$100,000. The insurance is only about half that amount. The mill was owned by an Ottawa syndicate, and was managed by J. Wilson, of New Westminster.

THREE canneries on the Fraser river, near Westminster, B.C., were burned on July 4. The Laidlaw cannery, owned by Rithet of Victoria, lost \$20,000, and two other canneries, the Phoenix and the Dumfries, at Steveston, lost \$35,000 between them.

THE Manson-Campbell fanning mill factory at Chatham, Ont., was destroyed by fire on June 24. Estimated loss, \$40,000, insurance, \$17,000. A new and much enlarged mill is now being built on the same spot. The mill has a frontage of 160 feet.

As a result of the recent efforts of J. McGregor to start a cold storage business in Montreal, the Dominion Cold Storage Co. has been formed there with a capital of \$300,000. The company will erect an extensive cold storehouse on the Lachine Canal Basin.

THE Robb Engineering Company have received orders this spring for creamery outfits from the following places: Yarmouth, Aylesford, Noel Shore, Granville Ferry, Great Village, Windsor, Berwick, Bridgewater, Harcourt, Grand Digne, and Hillsdale, King's county, N.B.

S. A. MCGAW, of the Lake of the Woods Milling Co., says his company are this year building 15 new elevators, the storage capacity being about 40,000 bushels each. Four are already completed, and the rest will be built at the rate of one a week. The storage capacity for wheat throughout the whole of Manitoba will be greatly increased this year, making it easy for the railways to handle the large crop expected.

THE Dominion estimates this year provide an additional \$3,600 to complete the Brandon Industrial School; \$10,000 for Portage la Prairie post office; \$12,000 for Moosomin court house, addition; \$5,000 for a court house at Prince Albert, and \$6,500 for a wharf on Lake Winnipeg, of which \$2,500 is a re-vote. There is \$8,000 for dredging in Manitoba, and a re-vote of \$25,000 for a bridge across the Saskatchewan at Edmonton.

THE following companies have been gazetted in Ontario: The Wallaceburg Flax Company, capital stock \$10,000. The Light, Heat and Power Company of Lindsay, capital stock \$70,000. The Toronto Dredging and Contracting Company, capital stock \$50,000, with these incorporators: F. H. Doty, E. F. Doty, F. W. Doty, Amanda J. Doty and Mary L. Doty. The *Home Journal* Publishing Company, capital stock \$3,000, with these incorporators: George E. Ellis, Norman G. Ellis, L. Van Allen and Bernard Saunders, jr., of Toronto, and Charles E. Carr, of London.

MR. CHARLES DEVLIN, a Pembroke, Ont., foundryman, has invented an apparatus to prevent the escape of sewer gas from sewers. It is very simple in construction. It is in the form of a box, to be placed under the sewer grate, and has an ingeniously attached "door" or covering at the bottom, so arranged that the slightest pressure from water passing through the sewer grating will open it, but immediately after the water has passed through it will close automatically. The sewer will thus be sealed up hermetically, and no gas can escape into house or street.

AN iron bridge is to be built at Nictaux Falls, N.S.

NIAGARA FALLS town is considering the question of building a hospital to cost about \$10,000.

THERE is a probability that St. Johns, Que., will have a new pottery manufactory in the near future.

THE Ontario Agricultural College, Guelph, Ont., is to have a \$10,000 extension. The new building is for the accommodation of classes in chemistry and bacteriology.

A SYNDICATE composed largely of Montreal capitalists has proposed to construct a waterworks in Perth, Ont. The syndicate would supply hydrants to the town at \$2,000 a year, and would expend \$60,000 on the work. The town will probably accept the offer.

MRS. W. WILSON was granted \$3,000 damages from the Montreal Rolling Mills on account of her husband, who, while attending to his duties as engineer, was killed by the machinery. Judge Caron held that the Rolling Mills Company had not placed sufficient protection around their machinery.

THE Swansea Forging Company, Ltd., Toronto, has applied for incorporation. Directors—G. Gillies, Gananoque, and J. Worthington and C. J. Gibson, both of Toronto. To buy, sell and deal in iron, steel and other metal wares. Capital stock \$100,000. This is the reconstructed Ontario Forge and Bolt Co.

THE new malleable iron and steel works at Toronto Junction, referred to in a recent number, were opened on the 27th ult. They work under a patent of John B. Hastings. The manager is R. J. Leigh; the secretary-treasurer, C. C. Going; foreman of machine department, W. J. Gore, and foreman of moulding, John J. Johnson.

THE bill incorporating the Deschenes Bridge Co. has passed at Ottawa. The company intend to construct a bridge over the Ottawa at Deschenes Rapids. The capital of the company is \$500,000. The head office is to be at Ottawa. Work must be commenced within two years and completed within seven.

THE Guelph Norway Iron and Steel Co., Ltd., of Guelph, Ont., recently referred to in this department, are applying for incorporation; directors, J. Watt, C. Kloefer, F. Dowler, A. R. Woodyat and J. E. McElderry, all of Guelph. They will manufacture iron and steel from ore and from scrap iron and scrap steel. Capital stock \$80,000.

A PRIVATE company is putting in a water supply at Lunenburg, N.S. Two Americans, C. L. Goodhue and W. C. Bidwell, are supplying the capital, and a company has been organized, of which J. Joseph Rudolf is president, and W. T. Tindsay, secretary. The work will be completed by the last of October. The cost is estimated at \$90,000.

THE Hamilton Iron and Steel Company, of Hamilton, Ont., have found it impossible to complete the construction of their smelting works by October 1st, as required by contract. They have applied for another extension of time until December 31. Their request will be granted by the city council.

THE annual convention of the Master Plumbers' Association of the U. S. was held last month in Philadelphia. John Date, representing the recently formed Master Plumbers' Association of Montreal, was present, and expresses himself highly pleased with the courteous treatment he received and the interesting subjects discussed at the convention. The question of affiliation with the American body is now being considered by the Montreal association.

THE LeBlanc Manufacturing Company, of West Pubnico, N.S., are applying for incorporation. They will make doors, sashes, ballusters, hand rails, mouldings, brackets, household, office and other furniture, capital stock to be \$3,000. The applicants are Louis P. LeBlanc, Charles A. LeBlanc, Laurie J. Amiro, Anselm LeBlanc and Moise I. D'Entremont, all carpenters of West Pubnico.

THE Taylor Hydraulic Air Compressing Company, Montreal, has elected the following officers. President, H. Millen; vice-president, J. R. Fair; secretary-treasurer, Robert W. Sutherland. The other directors are S. Carsley, C. H. Taylor and W. Alex. Griffith. The practical working plant which this company is putting in at Magog, Que., for the Dominion Cotton Co., is progressing satisfactorily; the shaft is now down about 80 or 90 feet.

CUNNINGHAME, MERRY & Co., of Scotland, are putting in a plant for making coke at Union Connox, Vancouver Island. This will be the first establishment of the kind on the Pacific, and Mr. Cunninghame believes that when they get ready in December next there will be a heavy demand. San Francisco alone uses 40,000 tons of coke, while numerous smelters being established in the mining districts will give an additional market.

IN a recent special trade edition of the Hamilton *Herald* the following reference is made to the file works of R. Spence & Co. Identified with the manufacturing progress of the city is the establishment of C. P. Moore, successor to R. Spence & Co. Mr. Moore is one of the most expert file makers to be found in the country. He learned his trade in the Old Country. He has worked in many of the leading factories in England and the United States. His superior work here has succeeded in building up the institution to its present high standard. The inception of this factory dates back twenty years, the present proprietor succeeding seven years ago. The establishment is located at the corner of Cannon and Cathcart streets, and gives employment to nine hands. It is well equipped with all modern appliances, and all goods are turned out under the immediate supervision of Mr. Moore, who is constantly employed in the shops.

THE Iron and Steel Association of Canada held a meeting at Queen's Royal Hotel, Niagara-on-the-Lake, on the 3rd and 4th inst. The object of their meeting was to fix prices and arrange terms of sale for the current year. As regards plain wire, the advances in price made a few weeks ago in Montreal were confirmed. The prices of rivets were increased five per cent. No decision in regard to wire nails was arrived at, but it is probable a similar increase will be made. The advance in price is due to the increased cost of raw material and the betterment in values. The iron and steel men in the United States made similar increases a short time ago. The delegates at the meeting were J. B. Kinghorn, representing Montreal Rolling Mills, F. H. Whitton, Ont. Tack Co., Hamilton; Cyrus A. Birge, W. F. Coole, Canada Screw Co., Hamilton; F. L. Parmenter, Gananoque, F. M. Thurston, Canada Screw Co., Hamilton; Geo. A. MacAgy, secretary Pillow Hersey Mfg. Co., Montreal; F. W. Fareman, Dominion Wire Mfg. Co., Montreal; J. H. Peck, M. A. Irwin, Montreal; C. H. Howard, Safety Barb Wire Co., Toronto; A. J. Somerville, J. George, Ontario Lead and Barb Wire Co., Toronto.

Mining Matters.

TRAIL CREEK, B.C., ships an average of 125 tons of ore a day.

THE Ontario Natural Gas Co. have struck gas at Sturgeon-Creek.

THE iron mines on Mud Lake, near Newboro, Ont., may again be operated.

THE Cariboo Company, at Camp McKinney, B.C., has put in a 10-stamp mill.

WORK has begun on the tramway between Silver King Mine and Nelson, B.C.

A BIG oil well was struck in Petrolia, Ont., a few days ago, by Fletcher and Berry.

VALUABLE mica mines are said to have been discovered by an Indian at Portgrave, Escoumanis.

GOODERHAM, Ont., has a plumbago mine boom. The mine is being opened by a Peterboro syndicate.

THE Mineral Creek Gold Mining Co., Ltd., of Nanaimo, has been registered. Capital stock, \$500,000.

THE Granite Creek Mining Company, Ltd., headquarters Montreal, is applying for corporation. Capital, \$150,000.

NEW stamp mills and other quartz-reducing machinery are being taken almost daily into the Rainy River gold region.

THE Rossland *Miner* says that \$100,000 worth of ore was produced by the B.C. mines in Rossland district during May.

ANDREW J. SCOTT, of Springhill, is now underground manager for the Drummond Coal Co.'s No. 1 colliery in Cape Breton.

THE hunt for oil in Essex county, Ont., has continued unabated during the past month, and several new wells have been struck.

THE tramway from the concentrator to Howson Creek, near New Denver, B.C., will be completed this month. The first 1 1/4 miles has cost \$15,000.

THE Cariboo Gold Fields' Co., Ltd., of Ashcroft, B.C., are about to place into position 12,000 feet of steel hydraulic pipe to be used in developing their claims.

J. R. PORTER has reached St. John, N.B., with some fine samples of manganese ore picked up in the Magdalene Islands, where it is said there are very large unworked deposits of the mineral.

THE St. Mary and San Juan, of Rossland, B.C., have been bonded for \$20,000.

A NEW 10-stamp mill has been started at the Woodstock mine in Halifax county, N.S.

A CLEAN-UP at the Cariboo mine, B.C., shows that 172 hours of washing yielded \$90 per hour.

THE Joggins, N.S., coal mines are at present turning out an average of 400 tons of coal a day.

A NEW plant is being built on the Meridian and Chicago mine properties, at Country Harbor, N.S.

THE Alexander Mining and Dredging Co. of Vancouver has been incorporated with a capital stock of \$3,000,000.

THE Nanaimo-Rossland Mining Co., Ltd., has been registered. Capital, \$500,000; \$25,000 worth of stock has been issued.

THE advisability of putting in a tramway to be operated by steam, between Rossland, B.C., and Trail Landing, is being discussed.

MR. BUTTERFIELD has started erecting a ten-stamp mill at the Captain gold mine, in Lunenburg County, N.S. The shaft is 80 feet deep.

THE Dominion Coal Company, at St. John, N.B., have leased Robertson's wharf, and will erect coal sheds and machinery for unloading there.

WINNIPEG capitalists are interested in a good bed of coal which is said to have been discovered at Buffalo Point, near to Lake of the Woods.

THE stockholders of the Pelee Gas and Oil Company have leased 7,000 more acres on Pelee Island. There are good prospects for gas, and probably oil.

A. BLANCHARD is now operating a new mine of chromic iron which has been discovered a few miles from Coleraine, Que. The ore is said to be rich and plentiful.

THE Nickel Plate Gold Mine, Nelson, B.C., has been bonded for \$20,000 cash and 20 per cent. of the capital stock of the company now in process of formation.

A BOSTON speculator named Fitzgibbon has purchased mica mines at Bergeronnes, Malbaie, and Lac au Castor, Que., and will work them on an extensive scale.

THE shaft is now down 24 feet on the Great Hopes claim, Deadwood Camp, and at the bottom may be seen some 6 feet of solid sulphide ore.—*Midway, B.C., Advance.*

AN exchange says: "The gold fever in the Rainy Lake district is assuming large proportions. Eight small sections of land in that country were sold a few days ago for over \$250,500."

A RICH discovery of gold has been made by Capt. Burbridge between Spokane and Northport, B.C. The ore assays from \$9 to \$41 in gold to the ton. Ten claims have been located.

THE Victoria Granite Co. are commencing operations at St. George, N.B. Their power will be supplied by a 30-horse power Robb-Armstrong engine and Monarch Economic boiler.

THE Kootenay Hydraulic Mining Co. has been registered in British Columbia, for the purpose of mining near the Pend d'Oreille river and other places. The capital stock is \$500,000.

A REPRESENTATIVE of the Standard Oil Co. has leased 20,000 acres of land in Essex county, Ont. Experts are examining the ground, and a boring plant is to be set up within a mile of Kingsville.

ORE smelters are to be put in use at Pilot Bay on the Kootenay Lake, and at Revelstoke, B.C. This will obviate the necessity of sending ore to the States, and will ensure quicker and cheaper traffic.

L. BEAUBIEN and J. O'Rourke, of Salem, Mass., have been inspecting the mica in the Saguenay district, and have bought up several new mines, which will be worked on a large scale during the summer.

THREE mining properties have been bought at Trail Creek, B.C., by prominent Butte mine owners. The price paid was \$20,000. The purchasers will organize a company and stock the properties for a large sum.

LAST year 844 whites and 786 Chinese and Japanese were employed in the placer diggings of British Columbia. The total yield was \$393,942 of gold, and \$8,500 of silver, making the average earning per man about \$283.

C. JOHNSON, civil engineer, of Vancouver, B.C., has in London, Eng., floated a hydraulic company which will begin operations on the Fraser River at Lillooet. The new company will at once commence putting in a \$50,000 plant.

IRON ore is now smelted by electricity in some parts of Nova Scotia. The method presents many advantages and promises to supersede the old blast furnace process.

A GOLD brick weighing 795 ounces, and valued at \$13,506, is on view at the head office of the Bank of Montreal. The brick is the result of the first clean up of the Cariboo Hydraulic Mine, of Cariboo, B.C.

THE Old Malaga Mining Co., Queens Co., N.S., have resumed work upon a lead that has been discovered since the old works shut down, and are now raising as good ore as has been seen upon a deck in Malaga.—*Can. Colliery Guardian.*

THE War Eagle Mining Co., of Rossland, B.C., has declared another dividend of ten cents per share, being at the rate of forty per cent. per annum. War Eagle shares could have been bought for ten cents each not long ago.

A VALUABLE oil field was accidentally discovered at Comber, Ont., recently. A party of men, while boring for water, struck surface oil at a depth of 90 feet, and at 103 feet struck gas. Experts say there is an extensive oil field in the vicinity.

THE Butte and Boston Co., who intend to purchase the Cariboo mine, near Midway, B.C., are sinking a shaft to test the property. At a depth of 40 ft. below the old level the ore taken out is equal to any milled at this well known mine, and the vein is getting wider.

O. R. SPRAGUE, of Buffalo, controls 7,000 acres of gold-bearing land in Ontario. In an interview he is reported to have said that he would not sell the whole property for several millions and has refused \$300,000 for a small portion of his property. The property is situated near Madoc.

H. D. SELLECK, of New York, is negotiating for the purchase of the gypsum mining properties owned by M. Lodge in New Brunswick, and in Halifax county, N.S. The mines will be worked on a large scale, and it is estimated that 30,000 tons of gypsum a year will be shipped from Petitcodiac to the United States.

J. B. HOBSON, mining expert, has averred that there is as much gold gravel in Yale, Lillooet and Cariboo districts as there is in the whole State of California. From the early sixties to 1874 some \$60,000,000 were taken out of the Cariboo district, but the valleys finally became too deep to be worked by the old-fashioned instruments, and the work was abandoned.

THE Ingersoll Rock Drill Co., of Montreal, are shipping a peat manufacturing plant to Southern Mexico. This plant includes appliances for digging the raw material out of the peat beds, for carrying it to the disintegrating sheds, for disintegrating it, for drying, for moulding and for storing it for the market. This extensive order, a part of which has already been shipped, will amount to over \$25,000.

IT is said that large deposits of alluvial gold have been found by Indians near the head waters of the Saskatchewan. For the past two years Indians have been washing gold out of the river sand, and D. B. McTavish, Government surveyor, has sent word to the controller of the mounted police to stop the practice until the Government is acquainted with the matter.

CHARLES BULLARD and A. E. Murray, of Lardeau, B.C., recently made a trip to Adams Lake and Tum-Tum Lake. At Adams Lake—which is a widening of Adams River and has abundance of fish—they found galena float, but no color of gold of any value. Near Tum-Tum Lake they found a vein of galena 20 inches wide but no gold. Quartz was found to the west of Adams Lake. Around Tum-Tum Lake are 5,000 acres of fine black soil.

A STREAK of very rich ore has been struck in the Badshot, assaying 4,000 ounces silver to the ton. This claim is on the south fork of the Lardeau, on Gainer Creek, and is owned by the Johnston and Campbell party. The rich streak of ore is 8 inches wide and will average 200 ounces silver. The owners have 5 tons of ore on the dump, and intend shipping a carload, having already arranged for their ore sacks and transportation.—*Kootenay Mail.*

THE Inverness, N.S., Coal Mining Company have secured the charters of a number of smaller colliery owners in Nova Scotia, and will in the future probably work the largest coal producing fields in the Pictou region. The capitalization of the company is \$1,000,000, but may be largely increased at the next meeting. The company, to escape the high freight rate on coal, will construct six steamers, the contracts for which tenders have been invited. They also contemplate the supply of coal for domestic purposes to the leading cities of the Dominion. They will establish their own coal yards in Halifax, St. John, Quebec, Montreal, Toronto, and other points where the demand will warrant. The coal areas now owned by the company amount to fifty miles or more.

A PARTY of men working for the Northern New Brunswick Mining Co. have left Woodstock to convey a crushing mill from the forks of the Tobique to a place called Gold Brook, 64 miles up the Serpentine River, where a discovery of gold was made 35 years ago.

THE Nova Scotia Mining Society have elected the following officers for the ensuing year. President, R. H. Brown, Sydney Mines; vice-presidents, Graham Fraser, New Glasgow; Charles Fergie, Westville, and Wm. Blakemore, sec.-treas., Harry Wylde, re-elected.

THE following companies have been recently organized in British Columbia to work gold mines in that province: The West Le Roi and Josie Mining Company; capital stock \$500,000. The Paris Belle Gold Mining Company; capital stock \$800,000. R. E. Lee Mining Company; capital stock \$500,000. Eureka Concentrating and Mining Company; capital stock \$500,000. Mountain Sprite Mining Company of Tacoma; capital stock \$500,000.

COLONEL BAKER has been paying a visit of inspection to the British Columbia gold mines, and in a long interview in the Victoria, B.C. *Colonist*, he speaks enthusiastically of the prospects of the Province as a gold producing centre. But he takes occasion to lament the fact that owing to lack of facilities much Canadian ore goes into the States. This could be obviated, he believes, if a smelter was built at Nelson, B.C., and an extension of the Columbia and Kootenay Railway was made to opposite Trail Creek.

THREE Edmonton, Alberta, miners have during the winter designed and constructed a mining apparatus to be worked by steam. A five-horse power engine sits on a small scow and runs two sets of elevators, one raising water and the other gravel. The washing apparatus is similar to that used in working by hand, but on a larger scale. The gravel is raised by being caught by the steel buckets of the gravel elevator. The apparatus is said to have shown very satisfactory results.

H. W. NESTELLE and James McCreary have arrived down from French Creek. Mr. McCreary is part owner of the Consolation mine, and Mr. Nestelle is manager of the Bellingham Bay Hydraulic Mining Co. Hydraulic machinery has not yet been brought in, and the work so far has been mostly for proving the ground. This shows that there is 20½ feet of pay gravel above bedrock, and last week water was used two to four hours a day, and \$20 a day was taken out, four men being employed. The owners are confident they have a bonanza

Railway and Marine News.

A \$20,000 dock will be built at North Bay this summer

WORK on the Newfoundland Railway has been resumed.

THERE are 1,600 men at work on the Parry Sound Railway.

THE new dry dock at Owen Sound will be 430 feet in length.

THE Buctouche and Moncton, N.B., Railway is reopened for traffic

THE C.P.R. intend erecting a station at Don bridge near Toronto.

THE total expenditure, during the fiscal year, on Dominion canals, was \$3,690,647.

THE work on the electric railway between Aylmer and Ottawa will begin in a few weeks.

THERE are now 1,800 men at work on the Ottawa, Arnprior and Parry Sound Railway.

THE Canadian steamer "St Magnus," which capsized near Cleveland, O., has been raised.

A SURVEYING party is at work laying out the proposed line of the Kingston & Smith's Falls Railway.

THE Dominion Coal Company's railway from Sydney, C.B., to Louisburg was opened a few days ago.

NAPANEE, Ont., is trying to get better steamer communication with Adolphustown and the lower bay ports.

FIVE new sleeping cars have been added to the Intercolonial Railway service. The cars are lighted by electricity.

THE Sarnia tunnel cost \$2,898,026. The annual earnings are \$249,479, and the working expenses are only \$101,186.

ONE thousand tons of steel rails from England have been landed in Prince Edward Island for the P.E.I. Railway.

THE C.P.R. engineers have completed the survey of the extension of the Nakusp, B.C., and Slocan Railway to Sandon.

THE Dominion Coal Company's Railway from Sydney, N.S., to Louisburg, is now completed.

THE Tilsonburg, Lake Erie and Pacific Railway have been advertising for tenders for the construction of 16 miles of line.

THE Perth, Ont., board of trade have recommended that a \$25,000 bonus be given to the Irondale and Bancroft Railway.

THE car ferry line for the transport of coal between Conneaut, Ohio, and Port Dover, Ont., will go into operation this month.

ALTOGETHER the Ontario Government has granted \$250,000 towards the construction of the Ontario and Rainy River Railway.

A FIRE recently broke out in the workshops of the Quebec & Lake St. John Railway Co., at Quebec. Considerable damage was done.

ST. JOHN, N.B., common council has been considering the advisability of constructing a steel or iron bridge over Newman's Brook.

THE T., H. and B. Railway Co have let the contract to build the central station on Hunter Street, Hamilton. The cost will be \$22,000.

ANOTHER railway is projected to be called the Ontario, Belmont and Northern Railway. It will run from Hastings to the Georgian Bay.

A COMMITTEE of Kingston men is still endeavoring to persuade the G.T.R. to move their shops from Belleville and Brockville to Kingston, Ont.

THE K. & P. Railway bridge over the Madawaska at Calabogie, near Renfrew, partially broke down while a train was crossing. No one was hurt.

THE Grand Trunk Railway workshops at Point St. Charles, Montreal, are closed for two weeks, and extensive repairs and alterations will be made.

FARR, the C.P.R. engineer wanted in Winnipeg on charge of attempting to burn his wife and family, was arrested in Vancouver, and is now awaiting trial at Winnipeg.

THE Allens, owners of the Manitoba North-Western Railway, have asked for power to construct a branch railway from Langenburg, Assa., south to near Elkhorn on the C.P.R.

SIR CHAS. RIVERS WILSON, the new president of the G.T.R., will sail from England for Montreal on August 7th, and will immediately begin a detailed inspection of the entire Grand Trunk system.

THE Port Stanley, Ont., council have asked the Dominion Parliament to grant the L. E. and D. R. Railways a bonus of \$3,200 a mile to extend their railroad from Ridgetown to connect with London and Port Stanley.

THE bonds of the Atlantic & Lake Superior Railway having been withdrawn from the London market, work has been suspended for the present on the section between Montreal and Quebec, on which the operations commenced last month.

W. F. MACLEAN, M.P., has been persistent in his agitation for a two-cent per mile railway rate in Canada, and the idea seems to be gaining ground in Parliament, although he failed to get a provision for a two-cent rate inserted in the International Radial Railway Bill in the House of Commons.

WE are sure to have the James Bay Railway built, if not by the G.T.R., then by a new company. N. Neelson, chief engineer, who has been sent out by the Toronto Board of Trade to survey and locate a new line, has been in North Bay to engage guides to assist in the survey.—*North Bay Times*.

EIGHT tenders have been received by the Dominion Government for the establishment of a line of steamships between Canada, Belgium and France, as follows: Two from the Furness Company of England, one from the Hamburg-American Packet Co., two from the Columbia and Belge Steamship Co., one from a Bordeaux syndicate, one from N. Armstrong, and one from Marsan & Marsan. The Government will not make the tenders public, as several of the steamship companies have not kept within the terms.

THE Brotherhood of Locomotive Engineers held their annual convention at Quebec on June 26th. There was a large attendance of delegates and the papers read were very useful and interesting. The Grand Engineers present were C. Lawrence, of St. Thomas, Ont., First Grand Assistant Engineer; A. Hudson, Third Grand Engineer, Ottawa, and P. Fennel, Oswego, N.Y., the recognized poet of the Order. Addresses were delivered by J. B. Elliott, master mechanic, Eastern Division, C.P.R., and W. Printer, locomotive foreman, C.P.R., Ottawa, president of the Convention Committee. The next convention is to be held in Ottawa in 1896, and the next union meeting will be held in Windsor, Ont., in 1897.

THE steamer "New Dominion," with 250,000 feet of lumber, sank recently near Parry Sound. Loss covered by insurance.

THE New York Central Railway will build a branch from Beauharnois to Caughnawaga, Que., to connect with the C.P.R.

THE boiler for the big dredge now nearly finished at Kingston is supplied by the Canadian Locomotive and Engine Co. of that city.

AT a stockholders' meeting of the Wiscasset, Me., and Quebec road a few days ago, \$18,000 were subscribed to extend the road to Albion Station.

THE steamer "Ocean" wrecked the gates of lock 17 on the Cornwall Canal last month. A delay of four days of navigation was the result.

THE Dominion Atlantic Railway Company have purchased a steamer in England for £36,000. The new steamer is to run across the Bay of Fundy.

THE Winnipeg steamer "Monarch" was wrecked at Long Sault Rapids a few days ago. All the freight was lost and the vessel badly damaged.

THE Ottawa and Gatineau Railway Company are endeavoring to obtain assistance from the Government towards the building of a bridge from Ottawa to Hull.

It is again reported in Quebec that the Boston and Maine corporation will buy the Quebec Central Railway and build a bridge across the St. Lawrence at that city.

THE fifth International Railway Congress was opened in London on June 26th by the Prince of Wales. The American delegates were delighted with their cordial reception.

THE Temiscamingue Railway, which leaves the C.P.R. at Mat-tawa, is now completed for a distance of 50 miles, and the bridge over the Ottawa will be completed in the fall.

THE Ship Railway office, at Amherst, N.S., is closed, says the Picton, N.S., *Standard*, and the hydraulic machinery, big engines, and iron rails will be sold and shipped away.

It is probable that a line of steamers will be put to run between Canada and South Africa in the near future. The Dominion Government is strongly in favor of the project.

DURING the last year the Quebec Central Railway has increased its earnings from \$288,699 to \$301,728. The net earnings have increased to \$97,752, as against \$90,519 for the previous year.

THE Ottawa River Navigation Company have built a new excursion steamer called the "Duchess of York." The craft is 160 feet in length and 41 feet beam, deck measurement. J. McGowan is captain.

THE Brotherhood of Locomotive Engineers of America will not meet next year, owing to the International Convention at Ottawa next May, but they decided to hold their meeting for 1897 at Windsor, Ont.

A BILL has been introduced into Parliament to enable railway employees to collect 60 per cent. of their wages while disabled from duty by accident, and enabling relatives to collect \$3,000 in case of permanent disability or death.

THE boiler plates of the new steamer now being built by the International Steamship Company of St. John have been condemned by Government inspectors. This will delay the completion of the steamer from July to November.

THE new London and Port Stanley Railway bridges, to be constructed over the Kettle and Mill creeks at St. Thomas, will be of steel, with stone abutments and piers. The Dominion Bridge Co., Montreal and Lachine, has the contract.

PARLIAMENT is being petitioned for the usual grant of \$3,200 a mile in favor of the Lake Erie and Detroit River Railway, to enable them to connect their line with the London and Port Stanley Railway, which they have leased for 20 years.

THE Milltown and St. Stephen Railway Co. are asking for tenders to build four miles and three-quarters of railways and bridges to connect the Shore Line Railway with the Penobscot Railway. The work must be begun before August next.

It is said that the C.P.R. will assist in the extension of the Sebasticook and Moosehead Railway to Onawa, where the C.P.R. line would be tapped. This would give the C.P.R. access to Wiscasset harbor, a thing they are said to have long desired.

THE Kingston & Pembroke Railway is in the hands of receivers. Three years' interest on bonds is overdue. The company is desirous of substituting four per cent. bonds for six per cent., and has endeavored to obtain authority for the issuance of new bonds at \$10,000 a mile for 113 miles.

G. E. DRUMMOND, of Montreal, launched a new yacht to be used specially for Radnor Forges. It was built in Montreal.

THE new dredge for the work on the Nation River has been launched at Toyer's mills. It will start to work this month.

THE schooner "Picton," of Cobourg, Ont., was sold by the Rooney Plunket Company to Capt. Grant Horne, of Garden Island, for \$1,000.

THE suit of Judge McCurry against W. G. Reid, of Montreal, for \$10,000 for services in promoting the Parry Sound Railway, has resulted in judgment being given in favor of the Judge for the full amount with costs.

A SCHEME is proposed at Whitby, Ont., for the establishment of a car ferry across Lake Ontario to Charlotte or some other American port. The matter has been discussed in the Whitby council, but nothing else has been decided.

THE by-law for the \$10,000 bonus to the Napierville, Que., Junction Railway, has been carried at Napierville. The line is to run from St. Remi to Stottsville, 18 miles.

CAPT. JOSHUA SLOCUM, of Yarmouth, N.S., is to start this month on a voyage round the world in a nineteen foot sloop. He recently sailed 7,000 miles with his family to reach New York after being shipwrecked.

WM. H. LAW, managing director of the Central Bridge Works of Peterborough, has closed a contract with the Coast Railway Company of Nova Scotia, for some large steel bridges, and is now at work at them. The two largest are to be delivered in October.

THE International Steamship Company, who are building a steamer, have had some of the plates in the new vessel condemned by government inspectors. The steamer should have been launched this month, but the delay of providing new plates will defer its completion until November.

THE evening excursions from Montreal by the R. & O. steamer "Columbian" have been discontinued, and that steamer will now run between Montreal and Kingston. The steamer "Canada" will replace the steamer "Saguenay" on the Saguenay route, the latter boat to be used in case of a mishap to a regular liner.

G. W. PANGBORN, mechanical engineer, has written to the Minister of Railways, stating that the Pontiac and Pacific Junction Railway track is in an unsafe and dilapidated condition. Mr. Pangborn's statements were partially denied by a Government inspector who made a subsequent examination of the road.

HALIFAX, N.S., will have its shipping facilities improved by the new wharf, which will take the place of the one lately burnt. It will have loading capacity for two steamers at the same time, etc. A new brick freight shed over 800 feet long is to be built along the water front for the accommodation of both the Dominion Atlantic Railway and the Intercolonial.

A CHARTER has been granted to the James' Bay Railway Company, consisting of: W. Mackenzie, H. D. Lumsden, G. A. Cox and D. D. Mann. The capital stock of the company is \$1,000,000, and they will construct a line from a point on the C. P. R. near Parry Sound, through Sudbury Junction and North Bay to James' Bay, at a point where the Moose River enters the bay.

J. McMILLAN, a C.P.R. fireman, a few days ago, climbed on the pilot of his engine and saved the life of a young woman who was standing on the track bewildered and powerless with fear. McMillan performed the act at the risk of his own life, for had he made a slight miscalculation in catching the woman they would both have been killed.

THE level of Lake Huron is rising again, the water in the St. Clair being now about three inches higher than at the beginning of June. Montreal papers say that the St. Lawrence in that city is now at the lowest level ever known. That is not the case with the St. Clair. The lowest water in the St. Clair was in 1858, and the level now is about a foot above the lowest water of that year.—*Sarnia Canadian*.

THE bridge built by the Central Bridge and Engineering Co., of Peterboro, for Bancroft and Irondale Railway, is thus referred to by *Engineering*, of London, Eng.: "A noteworthy feat has been accomplished in the case of a 90-ft. truss bridge for the Irondale, Bancroft and Ottawa Railway, Canada. The structure in question was shipped complete from the works of the builders, the Central Bridge and Engineering Co., Peterborough, Ontario, to its site. The principal dimensions of the structure as placed in the cars were: Length over all, 50 ft.; height of trusses, 12 ft. 6 in.; width over all, 11 ft. 9 in.; and the weight was 65,000 lb. The distance between the works and the bridge was 70 miles." A photo-engraving of a section of this bridge as it appears mounted on a car will be seen in the firm's advertisement in THE CANADIAN ENGINEER.

COL. GREENE has failed to secure the necessary funds to build the Shore Line Railroad. He is reported to have said that the directors would now take active steps to build the road, and that the county would be called upon soon to make a subscription of \$5,000 to the preferred stock, as provided by Act of the last Parliament.—*St. John Sun*.

J. D. SINGHAL has got back from the lower country. He went to Three Forks and crossed the Kaslo by stage. He found the towns rather dull, but the contractors are rushing construction on the Kaslo and Slocan Railway. They claim they have a thousand men at work, and that the road will be ready to carry ore in three months. If so, the C.P.R. will have to get a "move on" or lose the business.—*Kootenay Mail*.

A TERRIBLE railway accident happened on the G.T.R. near Levis, Que., on the morning of the 9th inst. Fourteen persons were killed and a large number injured, several of whom will die. The accident happened to a special train going to Ste Anne de Beaupre with pilgrims. A true explanation of the cause of the accident will probably never be known, as the engineer and fireman, the only persons who could throw light on the matter, were both killed.

THE reports that work is proceeding on the Hudson Bay Railway and that the C.P.R. have offered to build a portion of the road for \$7,000 per mile, have continued to circulate during the past month. As a matter of fact there is little likelihood of very extensive work being done this year, and the C.P.R. officials informed a representative of THE ENGINEER that the existing rumors are only a revival of previous rumors which they have frequently denied. The fact that the Dominion Government have decided to abandon the \$2,500,000 loan will, of itself, cause a stoppage of work.

THE new steamer "Prince Rupert" of the Dominion Atlantic Railway Co. (late Windsor and Annapolis), made her first trip from Digby, N.S., to St. John, N.B., on 1st inst., accomplishing the run in two hours and four minutes, or 21½ miles an hour. The *St. John Sun* says she is a magnificent boat and beyond doubt the finest on the eastern coast. She is 260 feet over all and has a tonnage of 1,158 tons. She is built to carry 350 passengers. Her master is Capt. Richards. Later advices say that the "Prince Rupert" broke her cylinder while on her maiden trip. A new cylinder will have to be sent from England.

JOHN CHARLTON, an owner of Canadian vessels on the lakes, has taken up with Hon. John Costigan, Canadian Minister of Marine, the question of the Dominion Government adopting raft towing regulations for the lakes similar to those proposed at the last congress by the Lake Carriers' Association, recommended by the War Department, and adopted by the House of Representatives, but which were killed in Committee of the Senate. Mr. Charlton tells the Canadian Minister of Marine that these regulations are now law in the United States. Unfortunately, this is not the case as yet, but favorable action upon them by the Dominion Parliament would undoubtedly hurry their adoption by our own Congress.—*Marine Review*, Cleveland.

IT is understood that the report of the three Government engineers—Messrs. Monro, Coste and Anderson—who were appointed to enquire into the Montreal harbor improvements, condemns the plan, known as plan No. 6, which the harbor commissioners desired to carry out. The Government engineers think the extension of the present low level wharves, or the construction of one or two high level piers, would meet the requirements of trade for a long time to come. The proposed widening of Commissioners street is also considered unnecessary, but the construction of the guard pier now in progress is approved of. Henry Bulmer chairman of the board, Andrew Allan, and Mayor Villeneuve have been at Ottawa discussing the matter with the Government.

THE project of bridging the Detroit River at Windsor has received the assent of the Railway Committee of the House of Commons. The undertaking is in the hands of the Canada and Michigan Tunnel and Bridge Company which has been promised by the railways interested all the funds that are likely to be required to complete it. The bridge must be commenced within five years and finished within seven. It will be a cantilever, with a draw-bridge in the centre, having a span of 1,000 feet. The draw-bridge will be forty-five feet above the level of the river, and during the season of navigation will be left open, except when required by passing trains. It was originally the intention of the company to build a tunnel, but they have thought that the railways and the travelling public will prefer a bridge, consequently the tunnel idea has been abandoned.

THE formal opening of the Sault Canal took place at Sault Ste Marie on June 13. The canal was fully described in THE ENGINEER in 1893; it is therefore unnecessary to repeat the full details. The total length of the canal across St. Mary's Island is 4,000 feet, or from the eastern to the western extremities of the piers, about 6,000 feet. With the approaches, the total distance is about three and one-half miles. The lock chamber is 900 feet long, 60 feet wide, with a depth of water sufficient to pass vessels of 20 feet draught at the lowest recorded stage of water below the lock. The lock fills in nine minutes, and can be emptied in seven and one-half minutes. The canal proper has a surface width at low water level of 152 feet, and a bottom width of 145 feet. At a point about 1,500 feet above the lock it is crossed by a swing bridge, over which the railway systems of Canada and the United States find accommodation. The works, altogether, cost about \$4,000,000.

WORK on the Toronto, Hamilton and Buffalo Railway is being pushed forward rapidly. Brantford will vote in a few days on a by-law to grant \$70,000 bonus to the road on its completion. Contracts for various sections of the road are being let rapidly, and work has already been commenced on the big tunnel at Hunter street, Hamilton, by A. Onderdonk, of Chicago and New York. The injunction which was obtained against the tunnel work by certain citizens who thought their property would be injured, has been dissolved, upon the company depositing a bond for \$6,000 as security. THE *Hamilton Herald* says it is in a position to state that the deal between the Toronto, Hamilton and Buffalo Railway and the C.P.R. has been settled. By this arrangement the C.P.R. will operate the line from Toronto to Hamilton, and the original plan for having a line from Welland to Hamilton and from Hamilton to Waterford will be carried out, thus connecting the C.P.R. with the Vanderbilt system. THE *Herald* says Engineer Wingate has gone over the tenders for the Welland line and work will be commenced at once.

Electric Flashes.

CHURMAN, N.B., is now lighted by electric light.

AN electric light plant is to be established at Brighton, Ont.

WORK is progressing rapidly on the Ottawa Electric Railway. THE Montreal electric street railway earned \$100,000 during May.

WORK has commenced on the Belleville, Ont., Electric Railway.

THE electric lighting system, at Windsor, Ont., is to be enlarged.

IT is said that the Gananoque electric road to Kingston will be built next year.

AN extra mile of street railway track is to be constructed at Peterboro, Ont.

THE electric road between London, Ont., and Springbank is nearly completed.

IT is said that the Gananoque electric road to Kingston, Ont., will be built next year.

THE new electric light building in Dunnville, Ont., is rapidly approaching completion.

AYLNER, Ont., is considering a proposition of Mr. Conroy to light the town by electricity.

A. & C. BOTTNER, of Berlin, Ont., will run the machinery of their box factory by electricity.

THE Winnipeg Electric Street Railway Company will spend \$50,000 in addition to their plant.

AN electric railway is proposed from Port Hope to Bewdly, on Rice Lake, a distance of ten miles.

THE Canadian General Electric Company have received orders for 25 cars for the Kingston street railway.

AT Nantasket, Mass., June 22nd, an electric locomotive ran on ordinary railway lines at the speed of 80 miles an hour.

THE Hamilton, Ont., council has awarded the contract for street lighting for five years to the Hamilton Electric Light Company.

THE Bell Telephone Company of Canada have elected Robt. Mackay as vice-president to fill the vacancy caused by the death of G. W. Moss.

SUBURBY, Ont., will put in waterworks, electric light, and sewerage, costing \$40,000.

THE Halifax, N.S., electric street railway will cost \$340,000 for building and rolling stock.

THE machinery at W. H. Polley's shoe factory, at Quebec, is now being run by electricity.

DURING the month of June the Galt & Prescott electric railway carried 13,000 passengers.

THE work of extending the Mimico Electric Railway to Long Branch, Ont., is now going on.

THERE is talk of running trolley observation cars over Niagara Falls, suspended 50 feet above the water.

THE Port Arthur, Ont., council will purchase the local electric light company's plant and franchises at a valuation of \$7,000.

It is estimated by engineers who have studied the subject that 16,000,000 horse power goes to waste every hour over Niagara Falls.

THE Danville, Que., municipal council has passed the by-law granting right of way to the electric railway projected by Feodor Boas and R. N. Greenshields.

A RADIAL electric railway between Sarnia and Florence, to run through Petrolia, Ont., is being discussed, and in a few months will probably be in working order.

J. T. PHILMS, a confectioner, of Rat Portage, Man., was killed from grasping the flexible cord of an electric light. He was standing on a damp floor at the time.

THE St. John, N.B., Street Railway Company has elected J. Ross, of Montreal, as president; J. M. Robinson, vice-president; and J. Warren, secretary and treasurer.

THE Montreal Street Railway Co., at the request of city butchers, will run a night service of refrigerator cars between the cattle markets, the abattoirs and the meat markets.

THE Oshawa Electric Railway was completed and ready for business on June 17th. The line is six and a-half miles long, and was put in operation just one month from breaking ground.

THE gross receipts of the year on the Ottawa Electric Street Railway were \$193,991.36, and the net profit \$71,655.69; \$4,164.55 was carried to the Rest fund. Last year's officers were re-elected.

THE Montreal Park and Island Electric Railway Company have begun the work of construction on the Outremont extension of their railway. The extension runs from Cote des Neiges to Westmount.

SHERBROOKE, Que., capitalists are applying for letters patent, to constitute a company to run electric and horse cars in that city, with power to extend their railway to any place in the district of St. Francis.

THE Danville, Que., council has passed a by-law granting a \$5,000 bonus to Greenshields Bros., towards building an electric railway from their mines to that town. The Shipton council has also granted \$6,000.

THE North West Electric Co., of Winnipeg, have elected the following board of directors. G. H. Streyel (president), J. M. Graham, G. A. Simpson, J. A. McArthur and H. Cameron (manager and secretary).

A MEETING of the shareholders of the Toronto Suburban Street Railway Company will be held on the 31st July, to consider what arrangements can be made with the creditors, and whether the line shall be extended.

ALL the material, except the cars, for the Halifax Electric Railway, has been contracted for. Work begins on the road this month, and will be completed by September. The road will be built at the rate of a mile each week.

THE Winnipeg Street Railway Co. will build a brick addition to their power house, roofed with iron, and a brick chimney 150 feet high, at a cost of \$60,000. The large new engines for this company are being supplied by the Laurie Engine Co of Montreal.

WINNIPEG Electric Street Railway Company will spend between \$50,000 and \$60,000 putting a new plant in their new works. The power-house is to have an addition which will include brick walls and an iron roof. A chimney 150 feet high will also be erected.

NIAGARA FALLS supplied the first electric power for commercial purposes, on July 2nd. The power was supplied to the Pittsburgh Reduction Company, and equalled 4,000 horse-power of electricity. It was the first test of the new works of the Cataract Construction Co.

THE Montreal Park and Island Railway Co.'s line up Park Avenue through Montreal Annex, has been put in operation this month.

THE electric railway from Buckingham Village, Que., to the station and the boat landing on the Ottawa, which has been talked of recently, will not be built till next year.

AT a meeting of the Quebec city council on the 28th June the scheme for the proposed electric railway was adopted, and it is expected that construction work will begin this month.

THE Galt, Preston and Hespeler Electric Railway have built an extension near Hespeler for the benefit of excursionists. The company will establish a park for picnics and other holiday purposes.

HARRY DENT, a market gardener 55 years old, was killed at Bracondale, Toronto, by an electric car on the night of the 27th ult. It was supposed he was seized with dizziness and lay down on the track.

THE Hamilton city council has at last given the contract to the Hamilton Electric Light and Power Co. for lighting the city for five years, at \$91.25 per lamp per year, the price asked originally by the company.

THE Ottawa Electric Street Railway Company propose building a loop line extension to their railway to connect with the exhibition grounds. Every effort will be made to have the line completed before the exhibition.

THE Ingersoll, Ont., Electric Light and Power Co., Ltd., capital \$45,000, has obtained incorporation, with Stephen Noxon, John Gayfer, Alfred E. Gayfer, Henry Richardson and George E. Gayfer, of Ingersoll, as shareholders.

WINDSOR, ONT., is going to use natural gas for fuel at the electric light works and pumping station. They estimate the annual cost at \$1,900 at the lighting station, and \$3,000 at the pumping station, which will be a saving of several hundred dollars.

THE Barrie and Allandale Electric Street Railway Company, Ltd., composed of J. H. McKeggie, J. Vair, G. Reedy, S. J. Sanford, J. Dickenson, all of Barrie, Ont., seek incorporation to construct and operate electric street railways in Barrie, Ont. Capital, \$50,000.

THE Niagara Falls Electric Street Railway Company, Ltd., has applied for incorporation. Capital stock, \$125,000. They will construct and operate an electric railway to run in the town of Niagara Falls. The promoters are A. Manning, H. Blake, Z. A. Lash, G. A. Manning, all of Toronto, and C. Black, of Niagara Falls.

AT the annual meeting of the Canadian Electric Light Company, Montreal, the following were re-elected directors. R. McLennan, C.E., president, Toronto; Adolphe Davis, vice-president; Henry Hogan, Robert Bickerdike, John D. McLennan, Cleveland, O., C. C. Claggett, and F. S. McLennan. Mr. McLennan is secretary-treasurer.

THE charter of the Napierville Junction Railway Company will be amended to permit of the construction of an electric line between St. Remi and Napierville, Que. The directors of the company are. General Riley, Ottawa. J. Fowler, Carleton Place. N. L. C. Pelletier, M.P.: L. St. Marie, M.P.P.; E. Lafontaine and T. Henry.

THE Dominion Parliament passed the Hamilton and Lake Erie Power Company's bill on June 12th. This gives the company the power of utilizing a portion of the natural water supply of the Niagara and Welland rivers for the object of promoting manufacturing industries and inducing the establishment there of manufactures and other businesses, also building electrical works along waterway courses.

T. W. NESS, of the firm of Ness, McLaren & Bate, Montreal, has just returned from a trip to the Western States, where he has closed a contract with the Standard Telephone and Electric Co., of Madison, Wis., for fifty thousand Mildé long-distance telephone transmitters. The Standard Co., after an exhaustive test of various transmitters, decided upon the Mildé patented microphone, for which Ness, McLaren & Bate are the Canadian and United States agents.

THE Hamilton, Grimsby and Beamsville electric railway carried 176 tons of freight, and transported 19,000 passengers during June. To show how the road has developed since it started last November, it may be mentioned that in their first month they carried 5 tons of freight and 1,050 passengers. They now make 17 round trips a day. The company are putting on a new freight car 28 feet long, with a double track.

THE *Cornwall Standard* says. The electric railway is again a live issue, and it is expected that the work of construction will be commenced in a few weeks. W R Hitchcock, of Cornwall, and D A Starr, of Montreal, have already interested several capitalists in the projected road.

THE corporation known as the Metropolitan Railway Co., of Toronto, are seeking bonuses from outlying municipalities such as York, Vaughan and Markham townships, Richmond Hill village, etc., for an electric railway which will make a speciality of freight as well as passenger traffic. The bonuses asked amount to \$60,000.

THE Co-operative Telephone Company, of the counties of Lake St John and Chicoutimi, Que., with a capital stock of \$10,000, headquarters at Hebertville, has been formed to build and carry on a telephone line. The applicants are: Joseph Girard, M.P.P.; Louis Alphonse Langlais, advocate, Elzear Ouillett, clerk of the Circuit Court of Hebertville, Joseph Tremblay, merchant of Saint Bruno; Arthur Boulanger, of St Joseph d'Alma; Louis Desbiens, merchant of St Jerome, P C Dupuis, merchant of Chambord, and C E Bernier, electrician of Roberval.

A PUBLIC meeting was held at Niagara Falls, Ont., on the 26th, when Wm Kyle, of Toronto, outlined a scheme for a belt line of electric railway connecting with the new Niagara Falls and Suspension Bridge Railway on the American side. The Canadian part of the road is to extend from the lower suspension bridge to the proposed new bridge at the Falls, taking in Lundy's Lane and Drummondville. Arthur Schoellkopf, of the Niagara Falls Hydraulic Power and Manufacturing Co., and Hans Neilson, are associated with Mr Kyle, and it is thought they will get a charter.

THE New Brunswick Telephone Company held its annual meeting last month at Fredericton. L. B. Macfarlane was present representing the Bell Telephone Co. The old board of directors was re-elected. Although a heavy loss was sustained by the storm in St John, during the year it was more than offset by the gains in other districts. The report showed a total gain of 135 instruments, 52 of which were put in at St Stephen, 70 at St John, 5 at Fredericton, 12 at Woodstock and a number at Moncton. It was decided to push along the through line from Moncton to Hopewell as fast as possible.

HUNTINGDON, QUE., has granted its electric light, waterworks and sewage privileges to the Stadacona Water, Light and Power Co., of Montreal. The municipality is to grant \$1,700 per year, for 25 years, for water supply for fire, and street sprinkling and street lighting, and the work of the company is to be completed by November 1st next. A water tower is to be erected above the rapids on the Chateauguay River. The tower is to be 125 feet high. The sewers will empty into the river below the village. This company already has similar privileges at Fraserville, Pointe-a-Pic, St Vincent de Paul, Cowansville and Sweetsburg.

A FENDER "FOR YOUR LIFE."—Among the many problems exercising the minds of mechanical experts since the introduction of electricity on street railways is the fender. D S Macorquodale, of Toronto, has invented an ingenious automatic fender. The principal feature of the fender is a specially constructed screw attached to the brake rod, one turn of the brake crank being sufficient to place the fender in position, so that almost any small object can be successfully and carefully picked up. After the first turn the further revolutions of the brake rod have no bearing on the fender, and, on the first reversal of the brake, the fender is placed once more in its usual position, some eight inches from the ground. The Toronto Street Railway Company are placing these fenders on their cars, and as a life saving device it has only to be seen to be appreciated. An illustration will be given in our next issue.

Personal.

H P BRUMMELL, assistant mining statistician of the Geological Survey, has resigned.

C P SCLATER, secretary of the Bell Telephone Co., Montreal, has been made a justice of the peace.

A B. LEE, president of Rice, Lewis & Son, Ltd., Toronto, is, we are glad to learn, recovering from his recent illness.

WHILE repairing the elevator in the warehouse of H. A. Nelson & Sons, Montreal, John Salisbury, machinist, missed his footing and fell from the third floor. He died from his injuries by the time he reached the hospital.

JOSEPH HOODLESS, an esteemed citizen of Hamilton, and a well known furniture manufacturer, died a few days ago in that city.

DR. BELL, of the Geological Survey, Ottawa, has left for the Hudson Bay region, and J. B. Tyrrel, of the same department, has left for Lake Winnipeg.

ALAN MACDOUGALL, C.E., Toronto, has this month removed his office from the Imperial Chambers, Adelaide street, Toronto, to the Aberdeen Chambers, on the same street.

J. WATSON, of the firm of Watson & Malcolm, manufacturers of Kincardine, Ont., is dead. Mr Watson was well known and respected, and was one of Kincardine's oldest residents.

FRIENDS of Frank Peters, of the Record Foundry & Machine Co., Moncton, will be very sorry to hear of the death of his little son Burton. While playing on a wagon at the farm the poor lad fell off and was crushed by the wheels, dying after a couple of days illness.

R. H. HORSMAN, vice-president of the William Sclater Co., limited, died suddenly at the General Hospital, Montreal, a few days ago. Appendicitis was the indirect cause of his death. Mr. Horsman was well known in mining circles.

HARRY H. HENSHAW, the popular secretary-treasurer of the Royal Electric Company, Montreal, was the recipient of a handsome set of drawing-room furniture, from the office staff of the company, on the occasion of his marriage to Miss Florence Thompson Christie, which took place in St. Paul's Church, Montreal, on 1st ult.

EDWARD E. HIGGINS, editor of the *Street Railway Journal* of New York, has visited Montreal in connection with the forthcoming street railway convention referred to elsewhere. The *Street Railway Journal* takes high rank among the special trade papers of the world, and Mr. Higgins wishes to be "on top" at this convention. He has made flying trips to Quebec, Ottawa, Toronto and Hamilton, and expresses the opinion that the convention will be a great success.

THE friends of F. Page Wilson, for two years on the editorial staff of THE CANADIAN ENGINEER, will be gratified to learn that he is now comfortably settled in his new home in Lemon City, Florida. Mr. Wilson is delighted with the climate of his semi-tropic home, and we trust his anticipations of the profits and pleasures of fruit farming will be more than realized. If Mr. Wilson puts the same ability, zeal and tireless industry into fruit farming as he did in his work on our staff, the fruit industry of the Biscayne Bay district will gain a decided acquisition, and Florida an estimable citizen.

THE *Boston Post*, in an article on the achievements of the American Society of Civil Engineers, speaks of T. Monro, C.E., as follows: "One of the distinguished guests of the American Society of Engineers at this convention is Thomas Monro, of Ottawa, president of the Canadian Society of Engineers. He is the builder of the great Welland Canal, connecting Lake Erie with Lake Ontario, and furnishing the connecting link in the chain of waterways from all the great lakes to Montreal and the Atlantic. Nothing ever did so much toward the building up of Montreal as that canal—just as the Erie Canal did in its day. Mr. Monro has been a consulting engineer for the Canadian Government for many years."

A GENERAL consensus of the opinions of expert railway men has elicited the information that the safest part of a train in case of collision is the middle car. A number of those who were approached, however, were of opinion that the cars next and next but one to the rear of the train were the safest.

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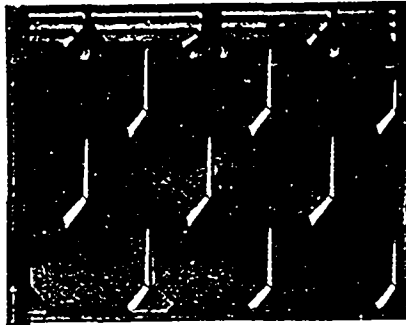
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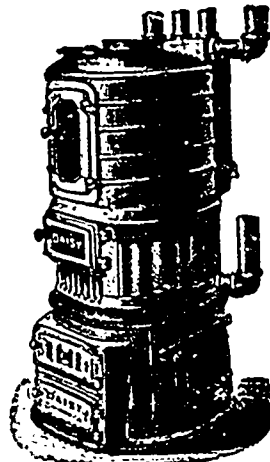
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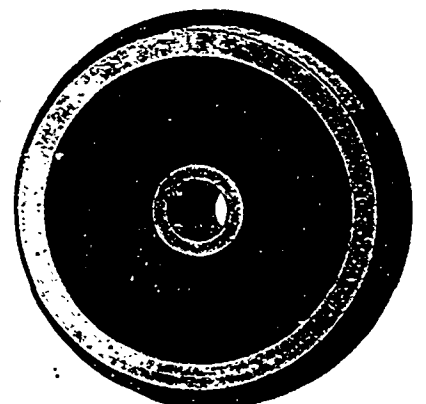
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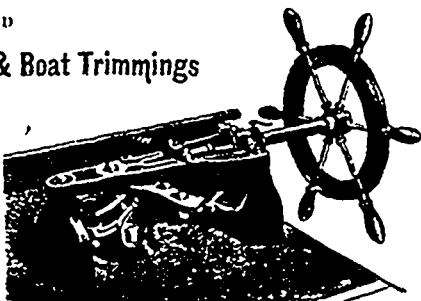
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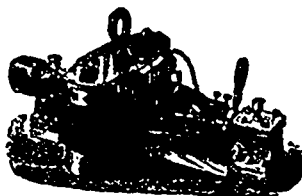
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