

which were passed round showed in an unmistakable manner the value of this addition; for, not only is the image produced robust and vigorous, and capable of thoroughly withstanding the lowering action of the fixing bath, but it possesses a rich red color, somewhat resembling an untinted albumen print, which seems to promise the possibility of securing any desired tone by the application of suitable means. Indeed, Captain Abney informs us that these images lend themselves with facility to the production of any of the tones obtainable with albumenized paper, while the printing occupies but one-third of the time.

The emulsion is formed in the ordinary manner. An alkaline chloride and an alkaline citrate in proper proportions are dissolved in a solution of gelatine, and this is sensitized by the addition of silver nitrate. When a sufficient time has elapsed to admit of complete combination, the emulsion is washed and redissolved in the ordinary way, and is then ready for use either on glass or paper. It will be observed that, unlike collodio-chloride (or, as Captain Abney justly calls it, "collodio-citro-chloride"), there is no free silver present in any stage of the emulsion, and it may, therefore, be assumed that when dry the films will retain their properties unchanged for an indefinite period. In the presence of excess of silver nitrate we know that gelatine will sooner or later discolor spontaneously. The proportions of silver chloride and citrate mentioned by Captain Abney are about two of the former to one of the latter, though it is possible that these may be modified upon further trial. The films, before exposure to light, are extremely thin and opalescent, and certainly do not appear capable of giving the density of coloration which is obtained with them.—*Br. Jour. of Photo.*

TRANSFER PRINTING PROCESSES.

An improved autographic transfer process for lithographic and zincographic printing has been developed by J. J. Magne, of Paris. The process consists in writing or drawing upon unprepared paper with inks or crayons having an affinity for fatty lithographic ink; then moistening the paper with a liquid having a repellent action for such ink; then inking up the writing or drawing with a lithographic roller, and finally transferring to the stone or zinc. The fatty lithographic ink is retained by the ink or crayon, but repelled by the liquid that moistens without attacking the cellulose of the paper, and the transfer is thus made without injury to the original manuscript, which may be preserved for an indefinite period. For the reproduction of printed matter by lithography or zincography, the same liquid is used, inasmuch as ordinary printing ink has the same properties as the inks of this invention. By moistening a printed paper with the liquid, and rolling up with lithographic ink, the typographic or other impression may without injury to the original be transferred to stone or zinc. The composition of the liquid is as follows: Water, 1,000 parts; acid (preferably sulphuric), 150 parts; alcohols (or their congeners), 350. These proportions may be varied, but it is essential that the proportion of alcohol should be high, in order to avoid injury to the original.

The formula above indicated gives good results; but it must be understood that the process is not limited to the employment of the precise ingredients herein mentioned, as this part of the invention consists essentially in the protective intervention of a substance (alcohols or other) in an acid liquid for the purpose of repelling the fatty ink. Under the term "acid liquid" are included not only acids properly so called, but also combinations of these acids with substances which, as they do not neutralize the acids, permit the combinations to act in the same manner as if the acids were pure. The patentee is thus enabled to use salts which, by reason of their acid nature, repel fatty ink; we may also add to the composition which fulfills the double purpose of preserving the paper and of repelling fatty ink, certain substances of a hygroscopic nature, which will retard the evaporation of the composition and keep the material impregnated therewith at a suitable degree of moisture. These substances may be briefly stated as being either of organic origin, such as gelatine rendered soluble, either hot or in the cold, soluble gluten, starch, dextrine, mucilages, gums, sugars, and glucosides, etc., or of inorganic compositions, such as deliquescent salts, etc.; and, in short, all substances capable of retarding the desiccation of materials impregnated with the composition. These substances may either be mixed directly with the composition, or they may be applied upon the originals to be reproduced either before or after impregnation with the composition.

For the production of autographic transfers any kind of paper of medium thickness, sized or not, or other material may be used. The inks employed are composed of protein substances (albumens, caseins, fibrins, etc.), and of bichromates, prussiates, alums, etc., forming liquid compositions capable when dry of retaining fatty inks. The following is the method of preparation: Dissolve in a quantity of water two or three times greater than the quantity of albumen (or other protein substance) a mixture of two parts of bichromate, prussiate, or alum, etc., to one part of ferrocyanide of potassium, by which a limpid brown solution is obtained. Beat up separately a certain quantity of albumen and its equivalent of water. The proportion of the mixture of salts relatively to the albumen employed should be about six per cent. The two liquids are intimately mixed together with the addition of a suitable quantity of coloring matter. The ink thus made is unalterable, remains constantly fluid, and drawings or writings may be executed in it with a pen, brush, or drawing pen upon any paper of medium thickness, avoiding cardboard and tissue paper.

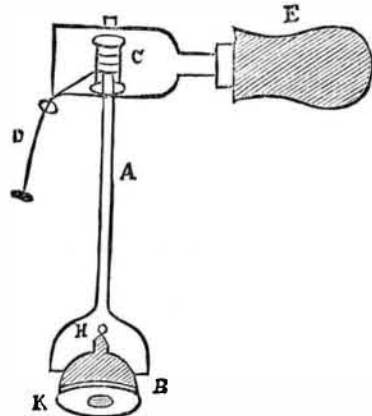
The crayons to be employed for the same purpose are of paraffin or its congeners, and lampblack, bone-black, ivory-black, etc., or other impalpable coloring matter, so as to form crayons marking like those of black lead, red chalk, or charcoal. The proportions for lampblack crayons are about 100 parts of paraffin to 16 parts of lampblack, but may be varied according to the depth of color desired. To produce crayons of different degrees of hardness there should be melted with the paraffin before mixture with the coloring matter a certain quantity of common or other resin, regulated by experience, but which should not in most cases exceed 10 per cent. The melted mixture is run into moulds, and, after cooling, the crayons are cut into lengths and either inclosed in stiff paper or cased in wood in the manner of ordinary lead pencils. If the drawing has been executed with ink alone it may be used as soon as it is dry, but if executed with ink and crayon, or crayon only, the face of the drawing should be held for one or two seconds over a vessel containing boiling water. The paper is then allowed to dry by exposure to the air, more especially if the drawing be done both in ink and crayon, after which the paper is placed face upward in a bath of water, acid, and alcohol, as before specified, and allowed to remain until it is thoroughly saturated,

which is known by a sort of exudation of the liquid through the pores. The paper is then carefully spread out upon a glass plate or on a board, and an inked lithographic roller passed over it, whereby all the lines of the drawing are coated with fatty ink. When sufficiently inked a damp sponge is passed over those parts of the paper which have retained any of the ink, taking care not to blur the drawing, which is then washed and placed to drain upon a slab of plaster, and when brought to the proper degree of humidity it is laid down upon the stone or zinc plate, and the transfer pulled in the ordinary way. In order to preserve the drawing in an unaltered condition it is necessary (1), to wash it with a solution of carbonate of ammonia or of soda filtered; (2) to rinse it in pure water; (3) to drain upon a plaster slab or blotting paper; (4) to dry it by strong pressure between blotting paper.

The process of reproducing printed matter is as follows: The mixture of alcohol and sulphuric acid, before referred to, is applied with a brush either upon the front or back of the printed matter to be reproduced. The paper becomes instantly saturated with the liquid, and the surface is then immediately washed by applying or plunging in pure water. The sheet is then spread very carefully upon a glass plate or board previously wetted, and a lithographic ink roller passed over the print, taking care if the roller is passed more than once over the print to moisten the surface of the latter with pure or slightly acidulated water to prevent the paper adhering to the roller. If this operation, which is very simple, has been performed by a skilled hand, it is only necessary to lightly wash the print to remove the excess of acid, which would otherwise bite the stone too deeply, then to drain upon a slab of plaster, and when brought to a proper degree of humidity, to lay it down upon the stone and pull it through. The transfer is then complete, and the ordinary lithographic process proceeded with in the usual way. When it is desired to reproduce both sides of a sheet, one side is inked and transferred first, and then the other side is inked and transferred. For the reproduction of typographic printing the transfer would be made upon a polished zinc plate, and then bitten in with acid in the ordinary way.

INSTRUMENT FOR COATING PHOTO PLATES.

M. FISCH presented lately to the French Photo Society a very ingenious instrument for covering copper or zinc plates with an even coating of bitumen or albumen. The plate to be coated is fixed to the apparatus by turning the screw, H, which raises the India-rubber, K, and causes a vacuum. The solution is poured upon the plate, and the apparatus held as in the following diagram. The string is pulled



A, Iron bar, to which is attached the pneumatic sucker, B. C, a bobbin made of wood, round which the string, D, is wound. E, handle to hold the instrument.

sharply on the beginning only, the rotary motion obtained continuing and winding up the string again, and so on as long as it is required. The idea is borrowed from a child's toy which amused our early years. I remember well a kind of windmill upon the same principle.

M. Gobert showed the members a very curious result which he had obtained by experimenting upon a new mode of obtaining a gelatino-bromide emulsion. He mixed a bromide with gelatine and allowed it to set. Upon this jelly he poured a solution containing the equivalent of silver nitrate. After a prolonged contact he found that the emulsification, or, more properly speaking, formation of the silver bromide was only superficial. Upon analysis he found that the water contained no silver, and that the gelatine contained no bromide. Upon washing the crust of silver bromide and drying it, it became very hard, emitting a metallic sound, and was useless for photographic purposes. The experiment is only interesting as a chemical reaction by dialysis.

M. Garnier made some very interesting experiments upon his process, which he names "athmography"—a new and strange chemical reaction which the inventor did not fully explain. I can therefore only describe what I saw, and make a few remarks thereon. M. Garnier took a copper plate upon which a photographic image (positive) was formed—I am not aware by what process. This plate was laid for about three seconds, face downward, upon two supports about one inch high. These supports were fixed upon the bottom of a wooden box; the interior of the box, or, properly speaking, the bottom of the box, was smeared over with hydrofluoric acid. After being exposed to the vapors of this acid for about three seconds, as aforesaid, the plate was laid upon a glass previously coated with a composition consisting (as well as I could learn) of borate of soda and sugar. The copper plate was firmly pressed for one instant only upon this composition, and then taken and covered over with a fine powder by the aid of a camel's-hair brush, in the same way as the image is formed for enamels by the dusting-on process. Thirty or forty proofs can thus be printed per minute. According to the powder employed any color can be obtained. If metallic oxides be used the glass can be placed in a furnace, and an unalterable picture be formed. In fact, the enamel process, although now so expensive and beautiful, will soon become as cheap as positives upon paper. It was wonderful to see the ease and rapidity of production. A new road is now about to be opened for photographic productions. They will, ere long, be "a joy for ever," and not a fleeting image of the past.—*E. Stebbing, Prof., in Br. Jour. of Photo.*

GELATINO-CHLORIDE OF SILVER PICTURES BY DEVELOPMENT.*

By B. J. EDWARDS.

FROM the earliest days of photography, chloride of silver has been most largely used in the production of photographs; but hitherto very little has been done in developing the latent image formed by the action of light on chloride of silver films. The idea is not, however, a new one. I have brought for your inspection some fine transparencies developed on collodio-chloride by Mr. H. J. Newton, President of the Photographic Section of the American Institute, New York. These beautiful pictures were presented to me in America, in the year 1872—just ten years ago. Since that time others have experimented in the same direction. Mr. Herbert B. Berkeley has from time to time published the result of his researches; and, more recently, Dr. Eder and Captain Pizzighelli have given details of their method of producing diapositives on emulsion plates containing chloride of silver in combination with gelatine. The same gentlemen have also shown at Vienna, and at the recent technical exhibition in this building, a series of beautiful transparencies which were universally admired. As these pictures seem to have awakened considerable interest in the process by which they were produced, I propose (this evening) to demonstrate the method of producing transparencies on gelatino-chloride plates, and to describe certain modifications in the development which I have found to give the best results.

For the preparation of the emulsion, the following simple formula is all that is required:

Gelatine.....	300 grains.
Cold water.....	4 ounces.
Nitrate of silver.....	240 grains.
Distilled water.....	2 ounces.
Chloride of ammonium.....	100 grains.
Water.....	4 ounces.

Mix the above in three separate vessels, allow the gelatine to soak for ten minutes, and warm all the solutions to about 120° F. Now add the silver to the gelatine, and immediately afterward add the chloride. Emulsify at the same temperature for about an hour; then allow the emulsion to set. Pass through canvas and wash in running water for some hours in the usual way. When washed and dissolved by gentle heat the emulsion will be ready for coating the plates. The glass chosen should be as thin and flat as possible, to insure contact in printing from the negative. The dried film should appear pure white by reflected light, and of an orange tint by transmitted light. The latter color is owing to the chloride of silver being held in an extremely fine state of division.

With regard to the sensitiveness of these plates, I have found them at least a hundred times less sensitive than ordinary gelatino-bromide plates. The time of exposure will depend, to a great extent, upon the color desired in the transparency and the strength of the developer. With a moderately strong developer an exposure of two or three seconds to diffused light under an ordinary negative will give all the detail.

The developer I use is a modification of Dr. Eder's formula, and that of Captain Abney. A stock solution is made as follows:

Citric acid.....	5 ounces.
Distilled water.....	20 "
Strong ammonia.....	2 "

The heat produced by the addition of the ammonia will cause the crystals of citric acid rapidly to dissolve. As soon as the mixture is sufficiently cooled the solution is ready, and will keep a long time. When required for use, mix three parts of the above solution with one part of the ordinary ferrous oxalate developer, freshly made, by adding one part of a saturated solution of sulphate of iron to three parts of a saturated solution of neutral oxalate of potash. Now add to each ounce of the mixture two or three drops of a twenty-grain solution of bromide of potassium.

This will form a very powerful developer for the gelatino-chloride plates, and, with a moderately short exposure, will give a rich purple tone to the transparency. For a pure black tone, expose less time, and use equal parts of the ferrous oxalate and citrate of ammonia solutions, with an extra drop or two of restrainer, if required. If much warmer tones are desired, six or eight parts of the citrate solution should be used to one part of the ferrous oxalate. Any shade of color may be obtained, from jet black to bright ruby red; but, with the weaker developer, it will be necessary to increase the exposure considerably. For instance, to obtain the ruby color, two or three times the exposure will be required than for the black tones with the stronger developer. In this way a great variety of beautiful tones may be produced at will; but the great advantage of this method of development consists in the very great latitude allowed in the exposure. When working by daylight, and with negatives of different degrees of density, it is practically impossible to be sure of getting the correct exposure except by repeated trials, unless the developer can be regulated to suit the exposure given. By my method this is easily done. I make three or more portions of developer of different degrees of energy—that is, containing a greater or less proportion of the ferrous oxalate. Should the transparency appear under-exposed, the developer is at once poured off, and the development completed, and all the details brought out with a more energetic solution. In the case of over exposure the operations are reversed. This power of correcting under or over exposure in the development of pictures on chloride of silver has not hitherto been obtained by any known method; and I think I may venture to assert that without the power of compensating for errors in exposure, the process of printing by development on chloride of silver, however beautiful in some of its results, would be practically useless. With regard to the keeping qualities of the developer, I find that after being mixed it gradually but slowly loses its energy, otherwise keeping in perfect condition for several weeks. It can, however, at any time be restored to any desired strength by adding the proper proportion of freshly-made ferrous oxalate developer, as in the first instance.

With regard to the utility of this really beautiful process, I think few will question its superiority for the production of the most exquisite transparencies for lantern slides, or for making enlarged negatives. There is, however, another application of the process which may eventually prove of far greater importance. I allude to the rapid production of silver prints on paper by development, instead of the present slow process of printing out under the negative. I

* Read before the South London Photographic Society.

have already made a few experiments in this direction, and, from the results I have already obtained, I should judge that it is not improbable that the process I have described to you to-night will prove in time the quick printing process of the future.

GARDENERS' COTTAGES.

If, during the present generation, there had been such general improvement in the habitations in which gardeners and their assistants are housed as there has been in the structures in which are grown the plants they cultivate, many of the craft would be better off in this respect than they at present are. This, of course, refers to the matter generally, not exceptionally, for, to the credit of many who own large

occupants to take a pride in keeping them nice.—*Gardeners' Chronicle.*

THE HIGHEST BUILDING IN EUROPE.

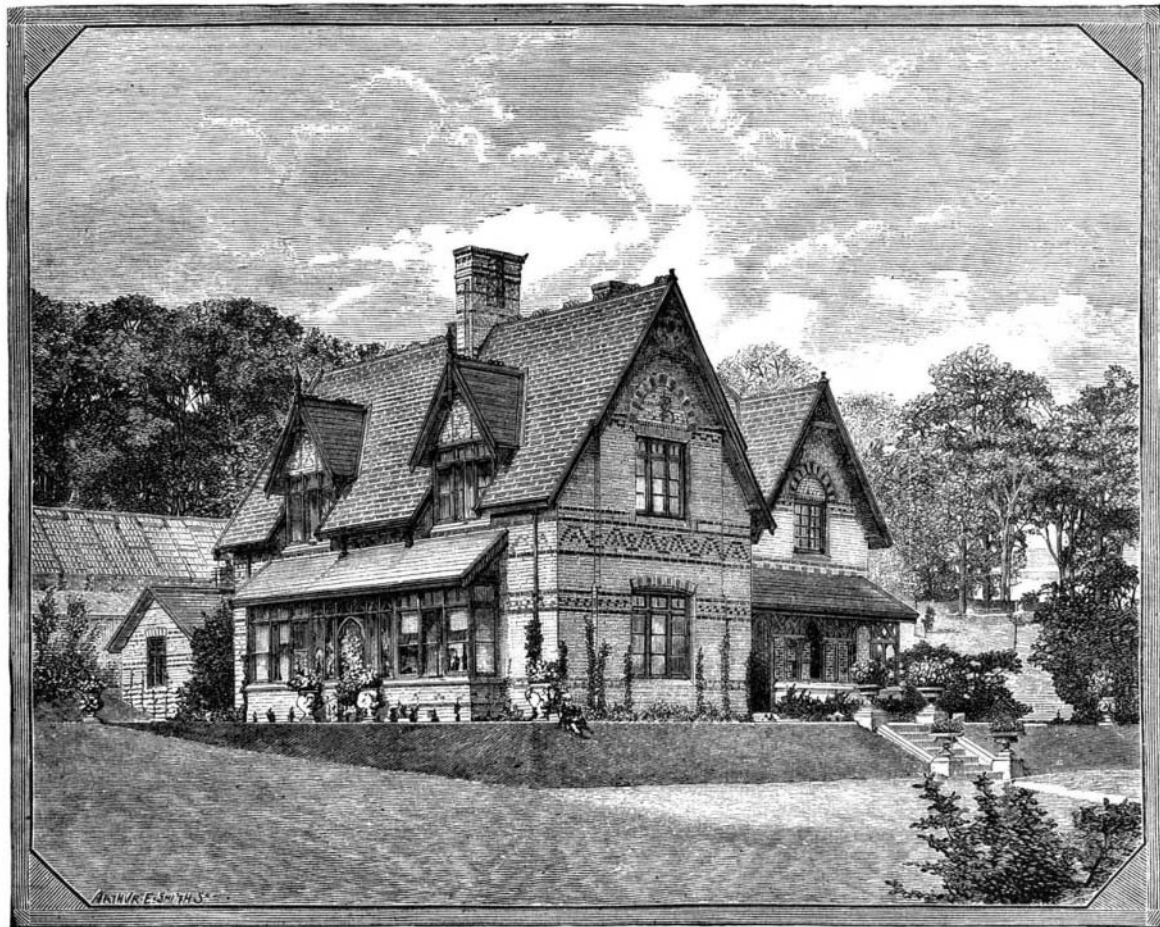
HITHERTO the hospice of the Great Saint Bernard, which stands 8,200 feet above the level of the sea, has enjoyed the distinction of being the most elevated inhabited building in Europe. This honor it can no longer claim. During the past year the city authorities of Catania, in Sicily, have caused to be erected, near the summit of the great volcano, Mount Etna, an astronomical observatory, which stands 2,943 meters above the sea-level, or fully 1,000 feet higher than the hospice of Saint Bernard. The structure is nine meters in height, and covers an area of 200 square meters.



THE "BOTHY" AT LAMBTON CASTLE, DURHAM.

gardens, there has been a marked improvement in recent times, not alone in gardeners' houses, but also in the places where the young men are lodged. Among such there are few places where more thoughtful consideration has been given to the wants and comforts of all engaged in and about the garden than there has been at Lambton Castle, as will be seen from the views we here give of Mr. Hunter's house, and also that in which the young men live. Both are really handsome buildings, possessing every convenience, with plenty of room in them. In the young men's house there is a dining-room, reading-room, and bath-room, and a separate bedroom for each man. Neither are the garden laborers forgotten in the matter of their dwellings. Within five minutes' walk of the garden there are half a dozen pretty, commodious cottages that have not only an air of comfort about them, but their external appearance is such as to induce the

It consists of an upper and a lower story, and is built in a circular form. In the lower story there rises a massive pillar, upon which is placed the great refracting telescope. The lower story is divided into a dining room, kitchen, and store-rooms. In the upper story there are three bed-rooms, intended for the accommodation of astronomers and tourists visiting the establishment. The roof consists of a movable cupola or dome. From the balconies of the upper story a prospect of vast extent and grandeur is presented. The spectator is able to see over half the island of Sicily, the island of Malta, the Lipari Isles, and the province of Calabria, on the mainland of Italy. The observatory is erected upon a small cone, which will, in the case of eruption, protect it completely from the lava stream which always flows down on the opposite side of the volcano.—*Builder.*

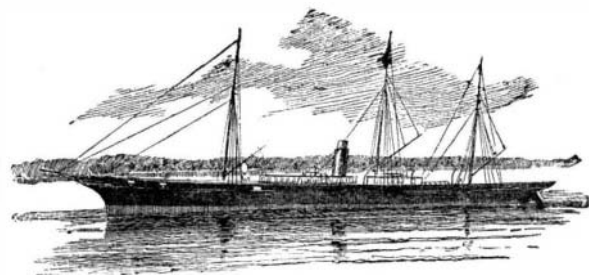


THE GARDENER'S COTTAGE AT LAMBTON CASTLE.

JAMES GORDON BENNETT'S NEW YACHT.

THE interior decorations of the Namouna are such as have never before been seen on a vessel—not even the Czar's Livadia. The best artists that this country possesses in this line were employed, and the effect produced is such as but few if any palaces or private residences on shore can rival. The woodwork of the various divisions is all of the richest, and each is of a different kind from the other. That in the ladies' cabin is of mahogany, that in the main saloon of English oak, and Mr. Bennett's private apartments in cherry. The ceilings are all elaborately frescoed, and the bed on which the owner is to repose cost \$1,000 alone. The Edison electric light illuminates every part, the successful application of that light on the steamers of the Oregon Railway and Navigation Company having demonstrated its superiority.

The engines were built by Ward, Stanton & Co., of Newburg, N. Y., and are of 400 horse power; high pressure cylinders, 22 inches in diameter; low pressure, 42 inches; stroke of piston, 28 inches. The boilers are two in number—shells 13 feet in diameter, 11 feet long, 120 square feet grate surface and 3,600 square feet of heating surface. Two pairs of valves manufactured by the Consolidated Safety Valve Company, of New York, and known as the Nickel Seated "Pop" Safety Valve, have been placed on the boilers. These valves are 4½ inches in diameter, and adjusted to allow a working pressure of 80 pounds to the square inch. The bearing surface is made of solid nickel castings, which prevent corroding or sticking fast in the seat. They are spring loaded, and will open and close on a variation of only



THE NAMOUNA.

two pounds pressure, and all the working parts are arranged with a lock-up device, which prevents any possible tampering with the valves. The steam gauges, clocks, revolution counters, and engine indicators for the engine and fire rooms are all of the most approved patterns, having been furnished by the Ashcroft Manufacturing Company of Boston. These important appliances are all in elegant silver-plated cases, the dials being of the same material and elegantly engraved.

THE NEW WELLAND CANAL.

THE enlarged Welland Canal is now open for traffic, and for the past few days the hearts of our citizens have been gladdened by the upward and downward movement of vessels through this channel—a channel destined when fully completed to revolutionize the carrying trade of the lakes. In 1821 the agitation for the construction of a canal to connect Lakes Erie and Ontario was begun, which culminated in 1823 by a committee of the Legislature reporting in favor of its construction, the canal to be of such dimensions as would accommodate the class of vessels then navigating the lakes. In 1824 the Welland Canal Company was organized. Through the unflagging efforts of the late Hon. W. H. Merritt public meetings were called, and every possible means taken to excite public opinion in favor of the work, but only a small measure of success attended the efforts, for at the ceremony of turning the first sod on November 30, 1824, only about half a dozen persons were present. Mr. Merritt, however, persevered, and finally succeeded in building the canal, notwithstanding the fact that the history of his company was one of financial embarrassment. The locks of this canal were of wood, 110 feet in length by 22 feet in breadth, the prism of the channel being 26 feet at the bottom and 58 feet at the surface of the water. It was five years from the date of breaking ground before vessels ascended from Lake Ontario to the Welland River, and thence through the channel to Lake Erie. In 1833 the work was completed to Port Colborne. In 1839, the Government decided to acquire the work, but it was not fully carried out until 1841. After the canal became the property of the Government it was enlarged and the locks constructed of stone. In 1870 the necessity for a still further enlargement could no longer be delayed. After thorough investigation it was decided not to enlarge the old channel but to build an entirely new canal from Port Dalhousie to Allanburg, there to join the old channel, which was to be deepened and improved to meet the enlarged scale of navigation. In 1871 it was decided to go on with the work, and in 1872 tenders were asked for portions of the work. All the contracts are now complete except the aqueduct at Welland and the rock-cutting at Stone Bridge. The non-completion of the aqueduct is a great drawback to the working of the canal, inasmuch as the scale of navigation contemplated cannot be obtained until the new structure is completed. However, the canal is open, and it now remains for the people of Canada to demonstrate to the world that they have not spent their money in vain.

The propeller John C. Gault, of the Wabash Line, which passed down the enlarged Welland Canal on Saturday last, is the largest propeller which has yet gone down to this date. The Gault has a length of hull over all of 233 feet, breadth of beam over all of 33 feet, and depth of hold 13 feet 6 inches. Her capacity is 31,000 bushels of corn on a draught of 11 feet 6 inches of water, and 42,000 bushels of corn on 13 feet 6 inches. Her cylinders are 24 and 54 inches bore (compound), with 3 feet stroke. She has two steel boilers 7 feet in diameter and 16 feet long, single furnaces, and five flues, and a steam pressure of 102 pounds. The time occupied in going through the new cut from Thorold to Port Dalhousie was twelve hours, and sixteen hours in going through the entire canal. Not the slightest hitch or difficulty occurred in the trip through the canal, and Captain Stewart expressed himself well satisfied with his first experience in navigating the enlarged Welland Canal. It is very satisfactory to know that the navigation is found to be satisfactory. Many of the gates work stiffly as yet, and some of the lock-tenders are rather green at the work. But this will soon be remedied by experience and use. The lockages are made in about twenty minutes.—*Chicago Tribune.*