Correspondence.

A Tip from an Inventor.

To the Editor of the Scientific American:

Under the heading "Tips for Inventors," the matter in your issue of July 21, 1900, reminds me of a very clever all-round inventor of the name of Alexander Barr, with whom I had the benefit of being intimate while serving my apprenticeship as mechanical engineer in Glasgow, Scotland.

Mr. Barr, or "Sandy" Barr, as his intimates used to call him, styled himself "Inventor for Manufacturers," and had a large clientele of manufacturers who used to come to him with their sorrows, and Barr generally invented some device to help them out.

I was in his sanctum one day, when a large egg shipper called and told Barr he wanted a better way of packing eggs. Barr talked over the existing methods of egg packing with him, and before he went promised to show him something new in that line inside of a week.

After the packer left, Barr turned to me and said, "What would you select in nature to hold an egg?"

"I don't know," said I.

"You would never select a sun-flower, would you?" said Barr.

"I think a tulip would be better, as far as shape is concerned," I replied.

"All right," he said. "Make a three-leaved tulip out of wire, with springs at the base of the leaves for adjustment, and of such a size to hold an egg of ordinary dimensions comfortably."

I set to work under his instructions, and the result was called "The Barr Patent Ovifer." Ovum—egg, and fero—to carry—thus derived.

Three wire tulip leaves were fastened at an angle of 120° on a piece of board, and held an egg very securely.

From the time the egg shipper left Barr's office till we had the first experimental egg holder finished was something like two and a half hours. The holder was subsequently bought by the egg shipper, who paid £250 for it.

Since then I see it has been improved upon by substituting two oval wire leaves, without any spiral spring at the base, but the first idea was gotten from nature. E. A. Suverkrop.

Philadelphia, Pa., August 21, 1900.

THE NEW ERA OF THE AMERICAN SAILING VESSEL.

BY WALDON FAWCETT.

Basing the conclusion on the development of the past few years there is nothing extravagant in the prediction that American sailing vessels will ere long have fully regained their supremacy among the world's wind-propelled craft. Statistics show, to be sure, that the decrease of American sail tonnage has been, during the past few years, proportionately as great as that of other maritime nations, but this is due almost solely to the passing from existence of old wooden hulks, which are now arriving at the termination of their period of usefulness in great numbers. The other side of the picture is vastly different. The problems presented by high priced fuel and other conditions have proved that there is yet a field of work for the sailing vessel, and five- and six-masted wooden schooners and steel sailing vessels are being constructed to meet the new requirements, and doubtless to prove, in their way, quite as successful and profitable as their predecessors.

These new vessels are considerably larger than the clipper ships with which American shipbuilders startled the shipping world about the middle of the century. In fact, most of the steel sailing vessels now being turned out at Bath, Me.—long famous as the home of the clipper ships—are in excess of 350 feet in length, whereas the "Great Republic," the largest of the old clipper ships, was but 325 feet long and carried but 4,000 tons as against 5,000 tons, which is the average capacity of the new vessels. The sailing vessels of recent construction, both wood and steel, have made some wonderful speed records and have easily discounted the performance of that one-time pride of the shipbuilders, the "Red Jacket," which sailed from New York to Melbourne, 12,720 miles, in 69½ days, or the "Sovereign of the Seas," which covered 5,391 miles in 22 days.

It must not be supposed that the sailing vessel of steel construction, or rather metal construction, is an absolute innovation. Early in 1883 there was launched at the shipyard of John Roach, at Chester, Pa., the "Tillie E. Starbuck," a full rigged iron ship, the first metal sailing ship built in the United States and one of the first turned out anywhere in the world. The "Starbuck" was also the first sailing vessel in the world to carry metal masts. She was 273 feet in length, 42 feet beam, and 26 feet depth of hold. She was of somewhat over 2,000 tons burden and cost $150,000. The seaworthiness of the iron sailing ship was early proved by the behavior of the "Starbuck" in a terrific gale around the Falkland Islands, when her iron masts neither broke nor stranded, and the general efficiency of this class of craft is attested by the fact that the vessel in question is to-day trading around the world.

As to whether the lately renewed activity in the construction of sailing vessels is to be permanent or temporary there is a wide divergence of opinion, even among men in the shipping world, and consequently it is equally uncertain whether the steady decrease in the sail tonnage owned in the United States can be stemmed. To present figures showing accurately the extent of this decrease is well-nigh impossible because of the manner in which the governmental statistics are prepared. For instance, whereas there are owned in the United States 13,300 sailing vessels, aggregating 1,825,000 tons burden, in all comparisons they are included with the unrigged craft, such as canal boats, and thus the total appears as 15,891 vessels of 2,388,000 tons. Regarding the iron and steel sailing vessels, the statistics are, however, presented in detail and show that there are owned in America 120 vessels of this class, aggregating upward of 174,000 tons burden. This is about one-eighth the tonnage of the steam vessels of iron or steel construction owned in the country.

The full meaning of the discovery of new usefulness for sailing vessels is in no wise better attested than by a glance at the condition of the shipbuilding industry on the coast of Maine—long the center of this branch of the industry. Shipyards which had been closed for years have been re-opened during the past twenty-four months and other plants have been improved in equipment and materially enlarged. In 1890 there were completed at Maine yards vessels aggregating almost 75,000 tons burden, but the industry gradually declined until in 1897 the total output was but 5,000 tons. In 1898, however, the revival set in and the year closed with a showing of almost 30,000 tons. The total passed the 50,000 ton mark for the calendar year 1899, and during that year the port of Bath alone turned out almost 40,000 tons.

Indeed, the port of Bath has, since the renewal of activity, regained the first rank among the shipbuilding centers on this side of the Atlantic. During the fiscal year which ended June 30, 1899, Bath built more merchant tonnage than any other customs district in the United States, and moreover she built more tonnage of this character than was turned out in any entire State of the Union, save Maine. Only three districts in the United States turned out more than 20,000 tons. The showing is as follows: Bath, 43 vessels, aggregating 46,693 tons; Philadelphia, 37 vessels, aggregating 37,625 tons; Cuyahoga (Cleveland, O.), 13 vessels, aggregating 34,467 tons. Bath is also, in proportion to population, the leading ship-owning city of America, there being 12 tons of shipping per person owned in that city.

The steel sailing ships, which are, of course, by far the most interesting of all the craft of this character, have all been built by the firm of Arthur Sewall & Company, of Bath. The Sewall yard was first established in the first quarter of this century, and since the launching of the brig "Diana" in 1823 more than a hundred vessels have been turned out. About six years ago the Sewall yard was transformed to a plant for building steel ships, and the "Dirigo," the first vessel of this class which they completed, bore the distinction of being the first steel sailing vessel ever built in America. The steel for this initial vessel was imported from Glasgow, but the material for the later vessels has been secured in America. The "Dirigo" has already made some remarkably speedy voyages.

The steel sailing ships "Erskine M. Phelps," "Arthur Sewall," and "Edward Sewall," which followed the "Dirigo" from the yard of Sewall & Company, are each upward of 3,000 net tons burden. In general design all three are practical duplicates. The "Arthur Sewall" may be taken as a fair example. She is 354 feet in length over all, 45 feet beam and 25 feet depth of hold. When loaded she draws about 22½ feet of water. The whole construction of the vessel is strong and rigid, and she will fully meet the requirements of any of the classification societies. She is a two-decked vessel, and both the lower and main decks are continuous, extending throughout the entire length of the vessel. The main deck is plated throughout, and the lower deck for about 200 feet amidships.

Two commodious steel deck houses are provided. One is 46 feet in length and the other 26 feet, whereas each has a width of 18 feet. In the former, which is located forward, are the crew's quarters, consisting of twenty berths, the galley engine and boiler room and coal bunker. The other deck house, located amidship, contains six rooms for the petty officers, and a carpenter's shop. In the poop, aft, is a large, handsomely furnished cabin for the captain. Here, also, is the dining room, and adjoining it the main saloon. Opening off the main hallway also are the officers' staterooms and lavatories and bath-rooms. On the poop deck above is still another house, with accommodations for several passengers. The "Arthur Sewall" will carry 5,000 tons dead weight on the draught above mentioned. She has a neat sail plan and each of her four masts is 100 feet or over above the main deck. The lower masts and topmasts are of steel in one length. Some of the spars are also of steel, including the three lower yards on each mast. The vessel cost over $150,000 and is sailed by a captain, four mates, engineer, sail maker, cook, steward, twenty seamen and eight boys—thirty-seven men in all.

The "Edward Sewall," the fourth and last of the steel ships to be turned out up to date by the Sewalls, is only slightly larger than the ship "Arthur Sewall" just described, but is thus entitled to rank as the largest steel sailing vessel ever built in America. She also is shipentine rigged and is 355 feet in length, 45 feet beam, 28 feet depth and 23 feet draught. She is a two-decked vessel with poop and forecastle and two deck houses for the crew and donkey boiler. Her lower mast and topmasts are of steel, each in one piece, and measure 110 feet above deck. The vessel carries a total of thirty-four sails and cost over $160,000.

The wooden sailing craft have in their recent increases in size fully kept pace with the development which has characterized their steel prototypes. When it was proposed to build a five-masted schooner as a successor to the three- and four-masted craft which had been in service for many years previous to 1898, the suggestion was laughed at in many quarters. Nevertheless five-masted vessels were constructed and proved a success. The same prophecies of failure greeted the plan, later, to construct a six-masted schooner, but the fall of 1900 will see the entrance into commission of the first latter class of carrier.

The pioneer five-masted schooner was the "Nathaniel T. Palmer." She is 285 feet in length, 44 feet beam and 22 feet deep, and spreads 10,000 yards of canvas. A vessel which, when she went into commission early in 1899, was the largest fore and aft schooner ever constructed for ocean service, was the five-masted craft constructed by H. M. Bean, of Camden, Me., for Capt. J. G. Crowley, of Taunton, Mass. A number of capitalists are interested with Capt. Crowley in this large vessel which cost $90,000, and the vessel men who have been talking of the speedy decline if not total disappearance of wooden sailing vessels have had some difficulty in reconciling with their theories the fact that such men as Henry W. Cramp, of the large Philadelphia shipbuilding firm, are among those who have put money in this and other similar ventures.

The five-masted schooner constructed at Camden, Me., is 318 feet in length, 44 feet beam and 21½ feet depth. The spread of canvas aggregates 10,000 yards and the vessel will carry 4,000 tons of coal on a draught of 23 feet. The frame of the vessel is of Virginia oak, and the planking inside and out of Georgia pine. There are five Oregon pine masts, each 112 feet long. The diameter of the foremast is 29 inches, while each of the other four masts is 28 inches in diameter. The vessel is lighted throughout by electricity and heated by steam, and has all the latest improved equipments, including steam steering gear and two 6,000-pound anchors. Like a number of other large schooners of this class, she is engaged in the coal trade between Philadelphia and New England ports.

The five-master had scarcely been completed ere Capt. Crowley opened negotiations with Mr. Bean for the construction of a six-masted schooner, and work on this monster craft was commenced in the autumn of 1899. The vessel, which will cost when completed $100,000 and will have a capacity for carrying 5,500 tons of cargo, will be ready to enter service late in the summer of 1900. The huge schooner is 330 feet in length, 48 feet beam, 22 feet depth of hold, and will draw 24 feet of water when loaded. Her lower masts of Oregon pine are each 116 feet long, and her topmasts are each 58 feet in length. Wire rigging will be used exclusively and four commodious houses are provided on deck. The pumps on the vessel are capable of throwing 1,000 gallons of water per minute, and the chains and anchors are exactly the same size as those placed on the new battleship "Kearsarge."

Perhaps the subject of the new era dawning for American sailing craft should not be dismissed without a word regarding the increased attention which the Navy Department is devoting to training ships. The remodeling of the "Hartford" has lately attracted considerable attention, but of far greater moment is the new training ship "Chesapeake," lately completed at the yard of the Bath Iron Works, at Bath, Me. The "Chesapeake" is the first sheathed vessel built in this country, and the only sailing vessel that has been built for the United States Navy since the sixties. The ship, which is full-rigged, is 225 feet in length, 37 feet beam, has three decks and 16½ feet draught and 1,200 tons displacement. She will spread 20,000 square feet of canvas.

The Meeting of the Association of Official Agricultural Chemists for 1900.

In harmony with the vote of the executive committee, the seventeenth annual meeting of the Association of Official Agricultural Chemists will be held in Washington, D. C., beginning Friday, November 16, and continuing over Saturday and Monday, 17 and 19, or until the business of the association is completed.

The authorities of Columbian University have extended the courtesy of the University lecture hall for the various sessions.

Science Notes.

A factory for liquid air is being erected at Los Angeles, Cal., for refrigerating purposes.

The monument to Lavoisier, erected by international subscription, was unveiled at Paris, July 27, in the presence of a large number of scientific men.

The superintendent of Yerkes Observatory, G. W. Ritchie, has recently perfected a device which renders it possible for astronomers to use the ordinary visual telescope for photographic astronomy. The device consists of a color screen that can be adjusted to the lens of a powerful telescope, thus adapting it for photographic use.

Among the American firms which received the "Grand Prix" at the Paris Exposition was the Smith Premier Typewriter Company, for their machines. The Prix was awarded at the highest rating of the jury, the machine leading all the others as regards the number of points allowed. "Jessop's Steel" was also awarded a Grand Prix. The firm's exhibit was much the same as that made at the Chicago World's Fair. The famous tool steel has taken over twenty highest exhibition awards. The Jeffrey Manufacturing Company, of Columbus, O., have been awarded a gold medal at the Paris Exposition for their elevating, conveying, and mining machinery.

At a recent meeting of the Société Française de Physique, M. Henri Villard announced that he had succeeded in giving a radio-active property to bismuth, by submitting it to the action of cathode rays in a Crookes tube. The best result is obtained by taking the metal as the anode, and the regions which are most exposed to the action of the cathode rays are found to be the most active. The experiment may also succeed by using the bismuth as the cathode, and in this case the region from which the rays depart is found to be the least active. Lastly, the bismuth disintegrated and carried to the walls of the tube is also radio-active. The activity communicated to the bismuth by an experiment which lasted about one hour is very feeble, and is quite inferior to that of uranium. It is nevertheless sufficient to permit of verifying by photographic means the fact that the rays from the bismuth will traverse black paper or aluminium, or the two together. This action appears to be permanent, for at the end of a month it had not appreciably diminished.

The color reaction of Klunge, obtained by the addition of cupric sulphate and sodium chloride solution to an aqueous solution of barbaloin, has been regarded as characteristic of aloin. E. Léger finds, however, that the red color developed is not due to barbaloin at all, but to the accompanying iso-barbaloin; pure barbaloin obtained by repeated recrystallization does not give this reaction, but the iso-barbaloin thus separated gives an intense violet-red color. Léger goes further, and employs the reagent of Klunge to purify barbaloin from its accompanying iso-compound, heating the aloin with solution and collecting the crystals which separate on cooling. In this way an aloin is obtained which ceases to react with Klunge's solution, and is, according to the author, pure barbaloin. When recrystallized from methylic alcohol, it is of a paler color than the impure aloin; it gives no color reaction either with Klunge's reagent or with HNO_3. Its triacetyl-trichloro-compound melts at 164 8° C. The author is examining Cape aloes, which he finds to contain barbaloin, as well as another aloin differing from those hitherto described by him.—Comptes Rendus.

The Rev. J. M. Bacon, of England, has invented a dot and dash system for the purposes of signalling from a balloon, and has recently been carrying out some interesting and exhaustive experiments from the car of a balloon, to endeavor to establish communication with the earth beneath. He ascended, in company with two other aeronauts, to a height of 2,000 feet. Suspended at the end of a wire, some 300 feet below the car, was a large cracker, such as is employed in pyrotechnic displays. This cracker was fired from the car by the passage of an electric current. The aeronauts observed the flash and then timed the seconds that elapsed before the echo was heard. About five seconds passed and then reverberating rolls of thunder were distinguished, lasting some twenty seconds. The noise, owing to the clear, rarefied atmosphere at that height was deafening. The balloon, at a height of 6.500 feet, then drifted over Aldershot, and attempts were made to communicate with the military camp beneath. Slung below the car was a concertina-shaped contrivance, controlled from the car by strings. These were suddenly jerked in a manner similar to that in which a telegraph operator actuates his key, and loud, intermittent sounds were transmitted from the instrument. Owing to the tendency of sound to travel upward, some time elapsed before the signals reached the earth below, and then the soldiers transmitted their replies by means of the heliograph. Once the communication had been established, no difficulty was experienced in the transmission of the signals. The aeronauts, however, were puzzled somewhat in reading the bright heliograph flashes at that altitude, owing to the flashes following each other somewhat rapidly.

Engineering Notes.

There are 120 firms in Germany engaged in the acetylene industry. Most of the burners are made at Nuremberg. There are no less than 26 small towns in Germany lighted by acetylene gas. The first plant of this kind for lighting small towns in Germany was erected at Hassfurt, a town of 2,500 inhabitants.

The United States monitor "Wyoming" was launched on September 8, at the Union Iron Works, San Francisco, Cal. The event was made a feature of the semi-centennial celebration of California's admission into the Union. Little more than the hull of the "Wyoming" is finished, but work is being pushed forward rapidly.

For some little time the air cars on the Twenty-eighth Street and Twenty-ninth Street cross-town lines of the Metropolitan Traction Company, of New York city, have not been in use, and the old horse cars were resurrected. Now, however, the rails on these streets have been replaced by heavier ones, and a new roadbed is being built. When the work is completed, the horse cars will be taken off, and new and heavier air motor cars will be substituted. In the new cars the heaters are much larger than in the old ones, and the machinery lies low down in the truck, thus giving great stability to the car. A number of new cars have arrived in New York, and are being tested on the Eleventh Avenue tracks. The storage battery cars on the Thirty-fourth Street line are run in considerable numbers, and the service is fairly satisfactory. At places there seems to be some difficulty in starting the car when there is a heavy load.

It has long been known that wood dissolves in concentrated acid, and that the solution on further dilution and boiling passes into dextrose. One could not start with diluted sulphuric acid, however, as then by-products would form, which prevent the isolation and subsequent fermentation of the dextrose. Alexander Classen has, however, now made the observation that ordinary chamber acid may be applied under certain conditions, and the observation has a more general interest. If one part of sawdust is mixed with ¾ part of acid of 55° or 60° Baumé, a greenish mass results, which, on extracting, does not show any sugar. But when we compress this mixture, the reaction begins, and a good deal of dextrose is formed. The pressure is kept on for half an hour, until the mass has turned dark and hard. Four parts of water are then added, and the broken-up pulp is boiled for about twenty minutes to complete the inversion. This method thus avoids the necessity of having to use concentrated acid, and there is, further, a saving in acid. The resulting dextrose is described as very good.

Fuel is now being manufactured in London out of mud, street refuse and sewage, for sale to the poor. A chemical process has been invented by which all this waste material is so treated that it is rendered combustible. Mud has been withdrawn from the Thames at Millwall, treated chemically and compressed in briquettes, that in appearance closely resemble blocks of dull ebony or bog oak. This mud has been proved to have a calorific value of 7·52 pounds. It burns readily, exhales a minimum of smoke, and leaves only 25 per cent of firm ash. The street sweepings are mixed with a small percentage of cheap chemicals, pressed into blocks, and sterilized by being subjected to an intense heat of about 400° Fahrenheit. This fuel produces great heat, burns freely with little smoke, and leaves very little ash. The sewage when subjected to this chemical process and pressed into briquettes looks like the best coal, so deep and rich is its sable character. This last fuel can be manufactured at the low cost of two dollars per ton, and is equal in every way to the cheaper coals. Licenses have been granted to manufacture the fuel from these hitherto waste materials, and works are shortly to be installed upon the river's banks at Barking.

Montan wax is one of the distillation products of lignite, which Von Boyen now seems to have obtained in a fairly pure state. The raw material can be prepared in two ways. The lignite is heated moderately and slowly, and steam of 250° C. is passed through the retort; the product, carried over with the steam, melts at about 70° C. Or the lignite is extracted with benzene or mineral oil, when a black or brown mass is obtained. When this raw material is again heated up to 300° C. and treated with steam of 250° C., a crystalline yellow substance results, which was, so far, the best Montan wax known. It resembles paraffin, but is very easily saponified. With potassium chloride it forms a salt, which, dissolved in ligroin, yields a fairly pure substance, melting at 84°. At any rate, redissolution in alcohol, and distillation over acetate of magnesia, does not raise the melting point any higher, and the analyses which Von Boyen made agree pretty well with the formula $C_{29}H_{58}O_2$. The wax would thus essentially represent a fatty acid of an exceptionally high order. Von Boyen calls the acid cerotinic acid. Its occurrence seems to be restricted to lignite. The acid can be distilled without undergoing decomposition, which is noteworthy, considering the 29 carbon atoms in the molecule.

Electrical Notes.

Consul Hughes reports from Coburg, July, 1900: In the Mittheilung des Vereins für Local und Strassenbahnwesen will be found an interesting paper giving details as to the way in which goods traffic is managed in three German cities—Gera, Frost, and Spremburg. They are not large places, but industrially very active, especially in textiles. The power used on the tramways is electricity or steam; the goods are transferred at the station onto smaller trucks, or the railway cars are taken over the town lines. At Frost there are three morning and three afternoon deliveries. At Gera perambulator cars, with flangeless wheels apart from guide wheels, have been tried with indifferent success. All these plants have been worked with a profit for several years, and though people have grumbled, the utilization of tramways for the goods traffic has points which cannot be dismissed without due consideration.

While the new Electric Railway in London is working smoothly and without the slightest hitch, the Underground Railway in Paris is experiencing many vicissitudes. There have been several accidents, fortunately unattended with any loss of life. The other day recorded a veritable chapter of disasters. First the current broke down, and the train had to stand still in the tunnel for about an hour and a half. A little later the first carriage of a train running from Vincennes to the Porte Maillot caught fire at the Bastille Station, through a spark from the electric motor. The woodwork blazed merrily for about a quarter of an hour, but the company's servants succeeded in subjugating the fire. In the evening another and more serious accident occurred, also at the Bastille Station, through the derailment of the end carriage of a train. There was a panic among the passengers, of whom about ten were bruised and shaken.

According to The Electro-Technical Gazette, German electrical works show great increase. On March 1 last, there were in operation 652 electrical works, against 489 the previous year. One hundred and twenty-two works were in progress of construction, of which 17 were to be ready for operation on July 1. Twenty-seven of all the works were completed before 1890; all the others were constructed within the last ten years. The number of places with electric light exceeds that of places illuminated by gas—900 against 850. The largest electrical plant is at Rheinfelden, with 12.360 kilowatts. Then follow one at Berlin, 9,230 kilowatts; one at Hamburg, 7,290 kilowatts; one at Munich, 6.110 kilowatts; two others at Berlin, of 5,452 and 5.312 kilowatts, respectively; one at Strasburg, 4,955 kilowatts; two others at Berlin, of 4.676 and 4,655 kilowatts, respectively; one at Chorzon, 4,310 killowatts; one at Frankfort, 4,152 kilowatts; one at Dresden, 3,580 kilowatts; one at Stuttgart, 3,208 kilowatts; and another at Hamburg, 3,150 kilowatts. All the electrical works supplied last year 2,623,893 incandescent lamps, 50,070 arc lamps, 106,688 horse power for electromotors, etc.

Polyphase alternate current machinery, which has been so much used on the Continent and in America, is slowly making its way into England. It has already been introduced to a small extent in coal mines. The polyphase motor was worked out in the first instance, because, when the early electric lighting stations for towns had been laid down, it was found that while those which had been installed with alternate currents could distribute energy very conveniently, they were at a great disadvantage in the matter of power supply. The alternate current motor of those days was like the gas engine; it was necessary to run it up to a certain speed to get it into synchronism with the current it was to make use of before it would work, and hence would not start without special arrangements. So a machine was designed into which two currents, each alternating, followed each other at intervals of a small fraction of a second, producing a magnetic field, which revolved, and which dragged a properly designed armature after it. This was followed by a motor, in which three currents followed each other in the same way. Diphase and multiphase generators were also designed to generate the currents in succession, as required. The great feature of the polyphase apparatus, so far as coal mining is concerned, says The Colliery Guardian, is the fact that the motor has no commutator, and no brushes bearing on it, and breaking circuit. There is, therefore, no sparking in the same way as there is with the continuous-current motor. For starting purposes, however, the machine requires the insertion of a resistance in its armature circuit, in order that the starting torque may be sufficient, and this necessitates the addition of slip rings on the shaft, similar to those through which the current is taken from the alternating current machine. The resistance is gradually removed as the motor gets up speed, just as the starting resistance of the continuous-current motor, and is entirely cut out when the motor is in synchronism. It is possible for sparking to take place at the contact between these rings and the conductors, but the chance is never so great as with the continuous-current motor commutator.

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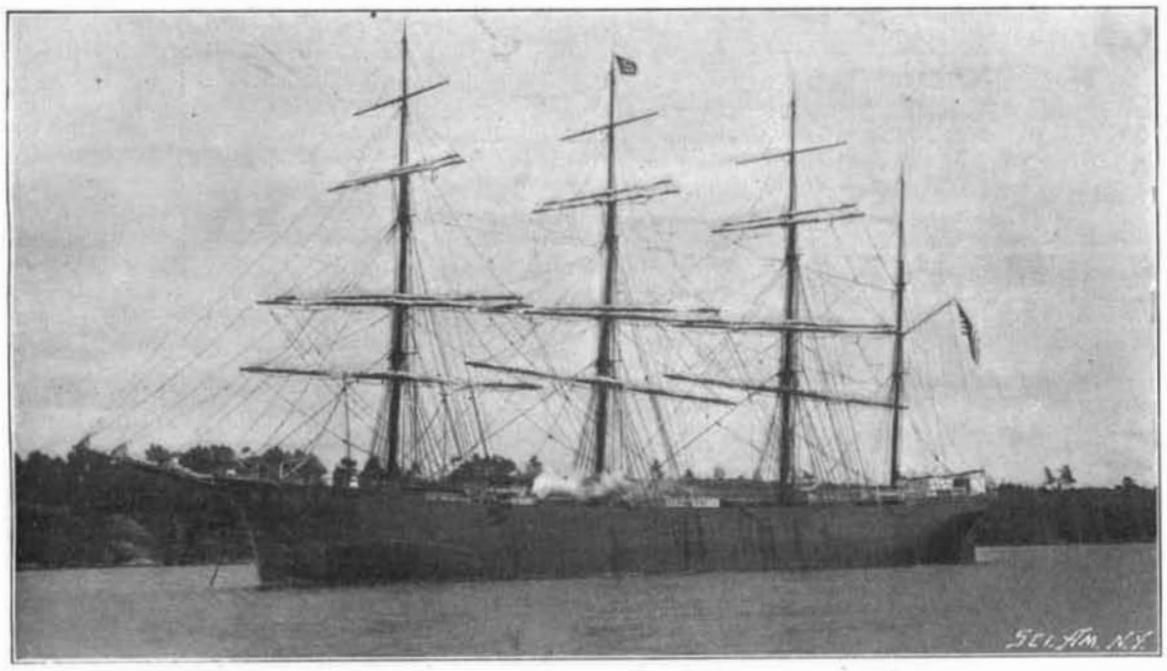
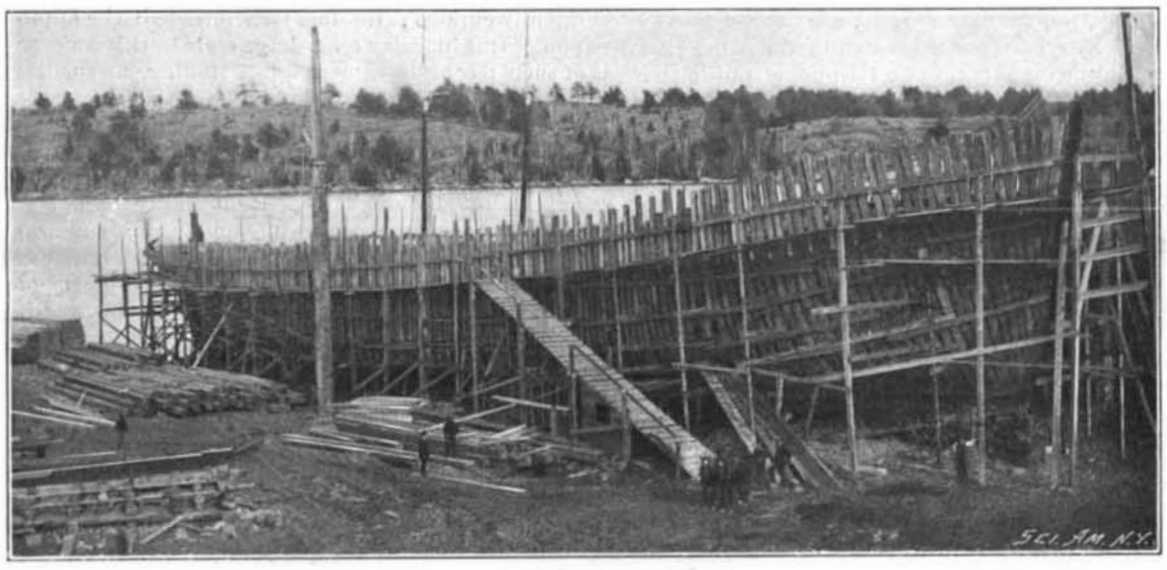
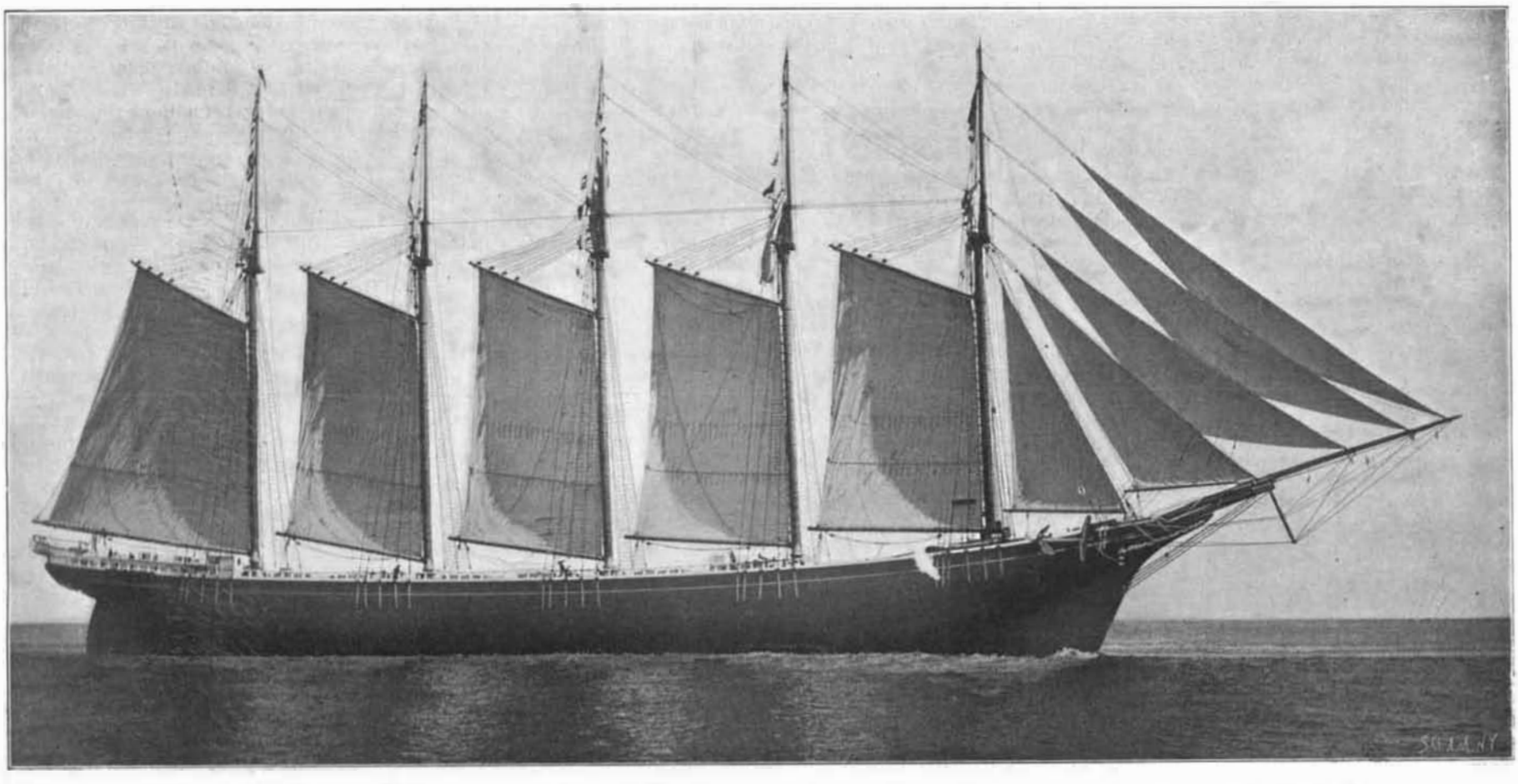


"Edward Sewall"—Largest Steel Sailing Ship Built in America.



Typical Wooden Schooner on the Stocks.

"Dirigo"—First Steel Sailing Ship Built in the United States.



Five-masted Schooner "Helen Martin." Length, 281 feet 6 inches; beam, 44 feet 8 inches; depth, 20 feet 9 inches; tonnage, 2,265.

THE NEW ERA OF THE AMERICAN SAILING VESSEL.—[See page 182.]