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NEW YORK, SATURDAY, MAY 21, 1892.

Contents.

(Illustrated articles are marked with an asterisk.)

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For the Week Ending May 21, 1892.

Price 10 cents. For sale by all newsdealers.

FAST SHIPS IN PROSPECT.

The thanks of the country are due to Mr. Bourke Cockran, of the House of Representatives, and to Mr. Frye, of the Senate, for their very able and successful advocacy of the bill for the American registration of those two noble specimens of marine construction, the City of New York and the City of Paris. Both ships, although built and sailing under the British flag, are principally owned by American citizens. The shipping laws of this country are intended to promote and encourage American naval industry, and hence, except by special act of Congress, no foreign-built vessel is allowed to carry our flag or engage in our coastwise commerce.

The necessity of providing the country with a fleet of superior ships of the highest speed and greatest coal endurance, for long voyages, has of late become extremely urgent. For years the SCIENTIFIC AMERICAN has advocated the construction of such ships as adjuncts for our navy in case of hostilities; and we are heartily gratified at the prospect which now presents itself of an early and ample realization of the project. It now looks as if the United States were about to enter upon a new era of maritime progress, which may ultimately result in the restoration of the ocean prestige we formerly enjoyed, before civil war made havoc with our sailing ships and foreign steamers grasped our trade.

The admission to registration of the two great ships we have named is coupled with the condition that they are to be subject to the use of the Navy Department in case of emergency, and that the Inman Company, to which they belong, shall immediately contract for the construction, in this country, of two additional ships of at least equal speed and strength. Our shipbuilding industry will thus at once receive a new and powerful impetus. Every effort will be made to render the new vessels superior in velocity and strength to any afloat, and this good beginning will doubtless lead to the permanent establishment of shipyards and appliances that will enable our workmen to compete with the world in every department of naval architecture. Since the passage of the act in favor of the two steamers mentioned, we notice that the Pacific Mail Steamship Company is about to apply for registration, on similar terms, for one of their large ships, now carrying the English flag, the China, which plies between San Francisco and Japan. The company agrees, in case registration is allowed, to build in this country two new and splendid boats, which, like the registered vessels, are to be subject to the call of the Navy Department. We give herewith portraits of the City of New York and the City of Paris, which are twin ships, and subjoin the following particulars.

The ships were built in 1887–88 by Messrs. Thomson, Clydebank.

Length over all	560	feet.
Breadth	63¼	"
Depth moulded	42	"
Tonnage (gross)	10,500	tons.
Displacement	13,000	"
Cylinders, two 45 in., two 71 in., two 113 in.		
Piston stroke	5	feet.
Boiler heating surface	50,265	eq. ft.
Grate area	1,293	feet.
Steam pressure	150	lb.
Indicated horse power	18,350	"

Of the speed to which they attain, it may not be uninteresting to show how their dimensions compare with those of other notable Atlantic steamers of the present and of bygone days, a comparison which we give in tabular form.

TABLE GIVING CHIEF DIMENSIONS OF NOTABLE ATLANTIC LINERS.

	Built.	Tons.	Length.	Beam.	Depth.	Proportion of Beam to Length.	Proportion of Depth to Length.
			ft. in.	ft. in.	ft. in.		
*Great Western	1835	1,340	212 4	35·4	23·2	5·99	9·15
*Great Britain	1841-3	3,500	274·2	48·2	31·5	5·68	8·70
†City of Glasgow	1850	1,600	227	32	24	7·09	9·45
†Britannic	1874	5,004	455	46	34	9·89	13·38
†City of Berlin	1875	5,491	488	44	36¼	11·90	13·46
†Gallia	1879	4,809	430	44	36	9·77	11·94
†Arizona	1879	5,147	450	45 2	37½	9·96	12 00
‡Servia	1881	7,392	515	52	40¾	9·90	12 62
†Alaska	1881	6,932	500	50	39 7	10·0	12·63
†City of Rome	1881	8,141	546	52	58¾	10·5	9·29
‡Aurania	1882	7,269	470	57	39	8·24	12·05
†Oregon	1883	7,375	500	54	39¾	9·25	12·57
‡America	1884	6,500	432	51	37½	8·47	11·52
‡Umbria & Etruria	1884	7,718	501·6	57·2	38·2	8·76	13·13
‡Salle	1885	5,381	455	48	36 3	9·47	12·55
‡Lahn	1887	5,661	465	49	36½	9·48	12·83
‡City of New York and City of Paris	1888	10,500	560	63	43	8·89	13·02

NOTE.—Those marked * were built of wood, † of iron, and ‡ of steel.

The keel of the City of New York was laid in June, 1887, and that of the companion ship, the City of Paris, shortly afterward. The vessels are constructed of steel made at the works of the Steel Company of Scotland, Newtown and Blochairn, and at the Mossend Steel Company's works. The material placed in position when the ships were almost ready for launching weighed, for each vessel, 7,000 tons, the heaviest casting for each ship being the stern post of 26 tons. The heaviest casting for the engines weighs 50 tons. The steel was thoroughly tested at the makers, under Lloyds' supervision, and carefully treated by a special process to remove as much as possible the chance of corrosion. The vessels were built throughout on the most approved principles of modern ship construction, and in many respects bold innovations, based on exhaustive scientific experiments, were introduced. The hull of each vessel is divided by transverse bulkheads into fifteen watertight compartments, including three for boilers and two for machinery, the latter being separated by a longitudinal bulkhead. The vessels have two bottoms, the space between them being 4 ft.

The vessels have each five decks. The total number of square feet on each deck is 27,000, so that, including the bottom of the hold, the vessels have each a flooring of over 150,000 square feet. The saloon is on the main deck, and forms a principal feature in the internal arrangements. A condition was that the vessels were to partake more of the arrangement of large first class hotels than of steamers. Eight feet is the usual space between two decks, and even the most skillful architect would find it difficult, if not impossible, to produce a saloon commensurate, either in size or artistic treatment, with the proportions and general design of such large vessels. Messrs. Thomson, however, solved this problem in the national liner America, and as the experiment in her case was most successful in every way, they have repeated the same arrangement greatly improved, making the roof of the saloon in the form of a large dome or arch. In the case of the new Inman, the saloon dome is level with the top of the houses on the upper deck, thus giving a height of 22 feet. The dome is 53 feet long and 25 feet wide. It is supported by heavy steel stanchions, the arch itself being formed of strong yet light framework of steel.

In designing the steering arrangements for these vessels, it was considered desirable to make them thoroughly efficient for war purposes in the event of the ships being used as armed cruisers, a condition which is not by any means fulfilled by the steering gear fitted to ordinary merchant steamers. The gear is powerful enough to put the rudder hard over when the ship is going full speed ahead, each hydraulic ram being capable of exerting a thrust of 80 tons, which is increased by the nature of the mechanism to 140 tons on the connecting rod, which is a shaft of steel 12 inches in diameter. The hydraulic pressure by which the rams are actuated is taken from the pressure main, which extends to the different parts of the ship, and the valves which admit pressure to one or other of the two rams are controlled by the quarter-master on the bridge by the motion of a small tiller, which takes the place of the usual wheel, and is said to admit of greater accuracy in keeping a given course. The position of the rudder is indicated on the bridge by a simple arrangement.

The ships are propelled by twin screws. The Inman Company was the first to adopt both the single and the twin screws in the Atlantic trade. The propellers are supported by two massive steel stays, each of which is a casting of steel weighing 26 tons and made by the Steel Company of Scotland.

The machinery consists in each vessel of two sets of engines of the three-crank triple expansion type, having piston valves throughout. Each set of the engines is capable of exerting sufficient power to propel the vessel at four-fifths of her maximum speed, so that should one set break down no serious delay will take place, for the vessel will go at a speed, say, of 16 knots instead of 19 knots per hour.

The auxiliary engines of each of the vessels number thirty-seven, the majority of which are driven by hydraulic power.

The average Atlantic passage of these boats is 6 days 2 hours, and the average speed of the voyages 19·20 knots, or a little over 22 miles per hour.

Senator Frye in advocating the bill to register these ships said:

"They have been specially designed and built to be not only the finest passenger ships afloat, and the safest, but also the most efficient commerce destroyers and cruisers. They have frequently crossed the Atlantic exceeding a speed of 20 knots for the whole distance, taking good and bad weather together.

"They have a remarkable coal endurance, capable of keeping at sea for seventy-two days, and steaming 10 knots, which is a valuable qualification as a cruiser. They are already fitted for sixteen rifled cannon. They were built under the inspection and according to the design of the British Admiralty, to the end that they might be efficient cruisers. Their boilers and engines are divided into separate compartments, so that the steamer could never be disabled by the floating or flooding of one or more compartments. Their boilers are protected from ramming or from shot by the coal bunkers on either side in water-tight compartments. Their engines are protected in the same manner by water-tight compartments, which can be filled with any suitable material when being fitted as cruisers. Their rudders and steering gear are under water, thus protected from shot. They are the only merchantmen afloat designed to meet all the above-described important qualifications as cruisers. They can escape by their speed any war vessel afloat to-day. They can

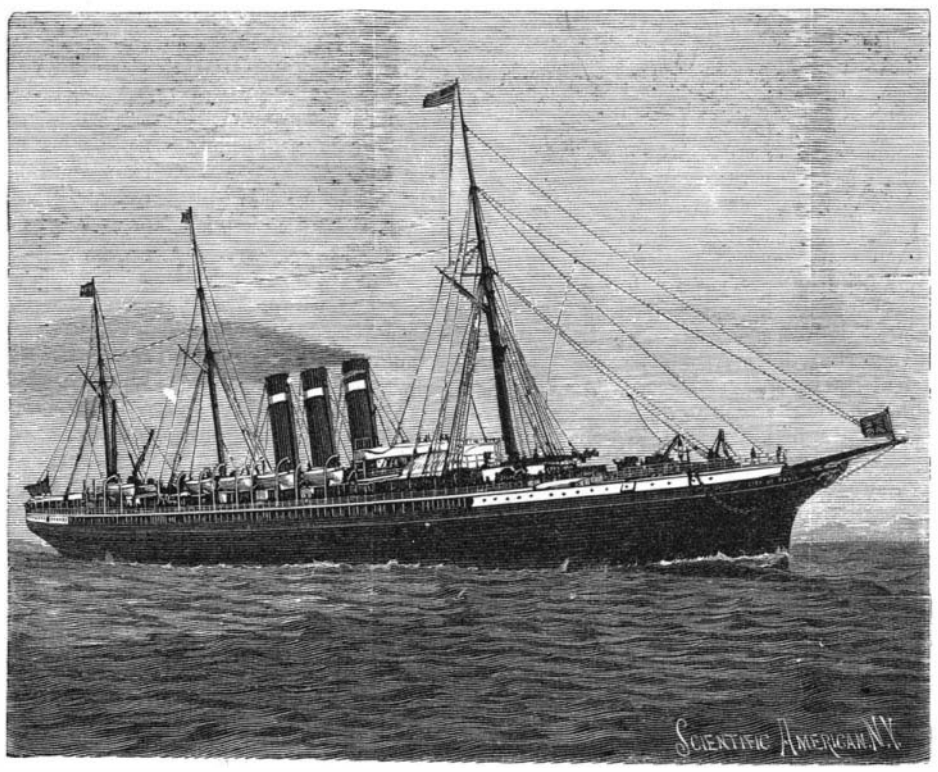
overtake and destroy any merchantman that sails on the ocean.

"They were built at Thomson's yard, on the Clyde. They cost about $2,000,000 each. The vessels which the bill provides shall be built here will cost about $2,225,000 each."

Secretary of the Navy Tracy in a recent letter to Mr. Frye says:

"It is difficult to imagine a more effective commerce destroyer than the steamship City of Paris, armed with a battery of rapid-firing guns. She can steam over 21 knots an hour, and can average 19·9 knots from land to land across the Atlantic. No man-of-war could overtake her; no merchantman could escape her. A fleet of such cruisers would sweep an enemy's commerce from the ocean. This fact is well understood in Europe, and states that are unprovided with a convertible merchant fleet are preparing to meet the possible emergency by partly protected cruisers that are substantially as fast as the City of Paris.

"The steamship City of Paris, referred to above in my annual report for 1889, and her sister ship the City of New York, are among the vessels that the United States might acquire by the passage of this bill. When it is considered that these two extraordinary ships will, by this legislation, be virtually added to the navy of the United States without cost; that the passage of the act is a guaranty that other ships equally fast and powerful will be built, which the government may likewise take advantage of in emergencies, the great importance of the measure in connection with the problem of naval defense in the United States cannot be overestimated, and I think it proper to state that although this bill involves the expenditure of no money in the Treasury, I consider it as second in importance only to the naval appropriation bill."



THE CITY OF PARIS.

Mr. Frye continues: "These two ships were built under the inspection and direction of the British Admiralty; and that Admiralty, knowing that they were built by American capital, demanded much more of these two ships than they did of any others built in England and subvented. The Majestic and Teutonic have none of the requirements, and none were made of them that were made of these two ships. They have not the coal bunker protections, and the engines and machinery are not below the water line, as they are in these two ships.

"Mr. President, I have a right to say that a ship will be built it this bill becomes a law, not of 10,000 tons, but of over 12,000, with a speed, not of 20 knots, but of 23 knots. The Cunard line now is building on the Clyde two vessels for the main purpose of surpassing these two, and the purpose of this company is to make one of these vessels a vessel that will be superior in every respect to the two Cunarders, so that one of these ships will be over 12,000 tons.

"I have a right to say further—I believe it fully—that another line of three of these great ships will be provided for, if this bill becomes a law, between New York and Antwerp, and with those the government of the United States will have seven of the finest war cruisers in the whole world. These two ships to-day are capable in two hours' time of taking on board sixteen rifled cannon and going to sea and answering a necessity which war may force upon us.

"In the last Congress the Senate passed two bills, one the tonnage bill and the other the postal subsidy bill, and I felt that I knew that if these two bills became laws we should be restored to our proper and rightful position upon the ocean, but, unfortunately, I say, the House of Representatives defeated the tonnage bill and crippled the postal subsidy bill, so that there was no inducement left for capital to build these first-class ships and put them on to these lines. Shortly after I spent a week in Philadelphia and New York, using all the powers of persuasion I was possessed of to induce capital to put these lines on, and it was a complete failure.

"I am authorized to say that some leading men and manufacturing and shipyard establishments in the United States have sent here their approval of this bill, and the names I shall read are a few of those I have received. I read them because they represent the leading friends heretofore for the rehabilitation of the merchant marine of the United States: Morris, Wheeler & Co., manufacturers of iron and steel plate, very prominent men in the Shipping League; the Phœnix Iron Company; the Pingree Iron Works; Morris, Tasker & Co.; the Cramps, shipbuilders; I. P. Morris Company, shipbuilders; James M. Swank, general manager of the American Iron and Steel Association; Penn Steel Company, shipbuilders at Sparrow Point; Handren & Robins, shipbuilders; Arthur Sewall, of the State of Maine, one of our largest shipbuilders, who just at this moment is putting in a plant to build steel sailing ships, the first in the country, I believe; Gen. T. W. Hyde, of my State, who is now building two cruisers for the American government; William P. Clyde; the Red D line, represented by its president; James E. Ward, of the Cuban and Mexican line; the president of the Brazilian line; the Metropolitan Steamship Company, represented by its president. The other names I will not read.

"The men whose names I read unite in saying:

'The admission of such a limited number of vessels to registry will not harm a single American interest, while the demand for the new vessels provided for in the bill will give an important stimulus to American shipbuilding and consequent employment to American mechanics.'"

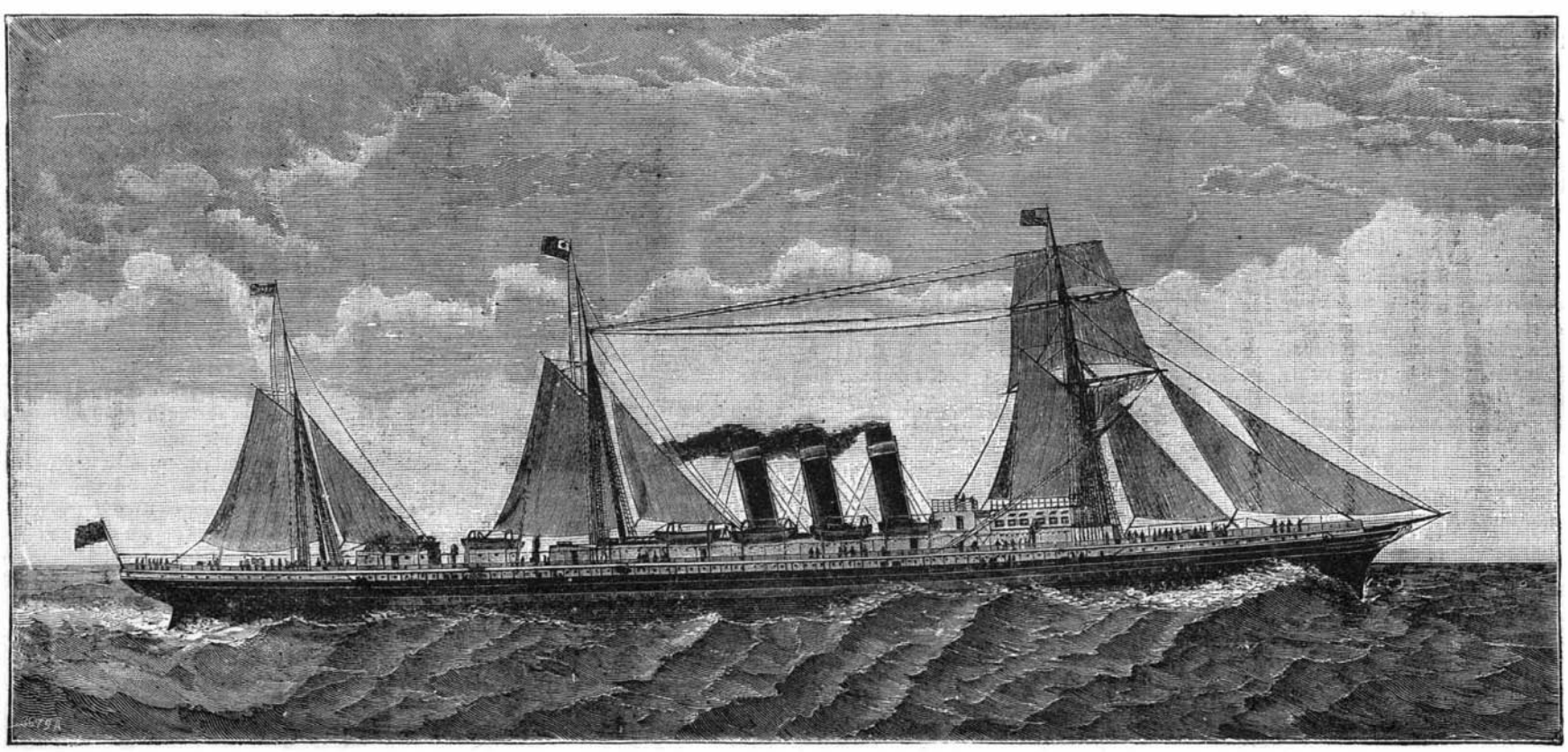
Process for Photo. Printing Plates.

Jacob Husnik, of Prague, Austria, gives the following description of his method for the production of gelatine relief plates, which, he says, yield the finest details of outlines or shaded figures in a very successful and artistic manner:

One kilogramme of soft gelatine is mixed with twenty-five cubic centimeters of glycerine and six liters of water. This is dissolved in a water bath and filtered afterward. Large sheets of strong paper or carton which have been immersed in water for about five minutes are stretched upon a plate of glass horizontally and small rims or flaps are formed on their edges. A layer of about three-quarters of a millimeter in thickness of the gelatine solution is poured upon said paper. After sufficient hardening of the gelatine sheets they are hung up to dry. After that they can be kept in store for years ready for use at any time.

The sheets of gelatine just mentioned are to be bathed for ten minutes in a solution of one part of potassium bichromate, twenty-five parts of water, and as much caustic ammonium as will make the bath yellow. The sheet is then spread upon a sheet of glass which has been covered with a film of wax in the same way as is done in the preparation of the so-called "pigment papers." The gelatine must then be dried in the dark. The sensitive sheet is then exposed under the negative glass, or in case of a figure with shades, under the positive glass, in the sun for about half an hour. The figure appears brown on a light yellow ground. The sensitive sheet is then laid in a large zinc dish, or any appropriate vessel, and a concentrated solution of sodium bichromate (1·8) is poured upon it. The sheet has to be rubbed with said solution by means of a brush, which must not be too stiff, or in any other way, so as to take off the superfluous gelatine from the carton or paper. The drawing remains upon it in elevated lines or traces. The relief is then washed and dried, and is ready for use.

In case of fire somebody asserts that a wet silk handkerchief, tied without folding over the face, is a complete security against suffocation by smoke; it permits free breathing, and at the same time excludes the smoke from the lungs.



THE CITY OF NEW YORK.

The Virginia Dismal Swamp.

The name of the Dismal Swamp, as well as its natural curiosities, has given it a weird interest. It is a little and curious world in itself, having its own vegetable and animal life. J. Ralph, in the *American Agriculturist*, gives the following description:

The Dismal Swamp in Virginia, one of the largest of the swampy tracts in America, is also one of the most promising areas for reclamation. It contains fully 1,500 square miles, and is at present of little value, except for a supply of timber, which is constantly diminishing. The swamp is situated on an inclined plane, gently undulating, and is really nothing but a continuation of the low, swampy, coastal plain which extends from Texas northward. It is an old sea bottom, and the western boundary of the swamp is a sea cliff and beach. Owing to the original deficiency of slope, it is swampy because the water cannot run off, and its swampy nature is increased by the growth of vegetation, which acts like a sponge in retaining water.

Near the center of the swamp is the famous Lake Drummond, about which so much has been written, and the origin of which is still an unsettled question. It has been supposed that during some time of drought a fire, burning the peat, has produced a large depression in which the waters of the lake have gathered. Prof. Shaler, of the United States Geological Survey, considers this explanation to be improbable, although smaller pools have been produced in this way. He offers as a theory that as the vegetation grew upon the old sea bottom, which had been raised to dry land, it began to grow first on the margin, and gradually to extend over the entire area, Lake Drummond being the last place to be filled. One of the most interesting features connected with the Dismal Swamp is its peculiar vegetation. Trees generally cannot grow in very swampy tracts, for their roots need to have access to the air during the growing season. The bald cypress (*Taxodium distichum*) under ordinary conditions differs in no way from an ordinary tree with respect to its roots; but in swamps such as the Dismal Swamp, where the roots are beneath water all the year, it has formed the habit of sending a knee-like protuberance from the roots up above the water into the air—breathing holes one might say, for the roots. In this way the cypress can live in very wet swamps. The black gum of the Dismal Swamp accomplishes the same end by arching its roots so as to raise portions of them above water.

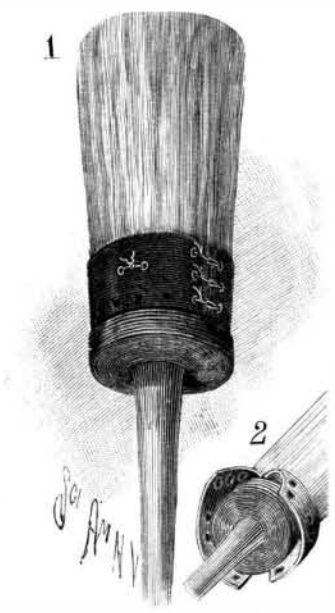
As would be expected, the animal life of this great swamp is also peculiar. No squirrels exist because there are no nuts; ground-loving animals are also absent because of the extreme wetness, so that there are no mice, moles, squirrels, or other animals of this class. Birds which build on the ground cannot live here, and the chief animal population of the higher classes consists of water birds and snakes. Of the larger animals, bears are abundant, and there is a peculiar and very ferocious species of wild horned cattle. These animals, probably the descendants of former domesticated cattle, are now thoroughly wild and very dangerous. The fights of the wild bulls are said to be very exciting by those who have seen them, and in the contests between the bears and bulls both are sometimes killed. It is said the bears, in order to escape the danger from the horns of the cattle, have the habit of springing upon their backs and rending the muscles supporting the head of their prey.

This region is in part a wilderness, but some efforts have been made to drain it, though these have been in the main unsystematic and unscientific, and have produced little result of value. Prof. Shaler estimates that by a proper system of draining this great swamp, fully 160,000 acres of land can be reclaimed at a cost of $4,000,000, making the land worth some $16,000,000. The region is very favorably situated for cultivating and marketing garden crops. Experiments already made prove the soil and climate to be admirably adapted to the cultivation of vegetables. The Norfolk district, where a costly system of fertilizing is necessary, now furnishes a large part of the supply of such crops to from four or five million people along the northern coast, and the demand is certain to increase. The drainage channels could furnish water transportation to within a mile of every part of the tilled area and thence to the sea.

AN alloy of gold and aluminum has recently been made. Its color is a most beautiful purple, and it will be valuable in making jewelry.

AN IMPROVED PAINT BRUSH BRIDLE.

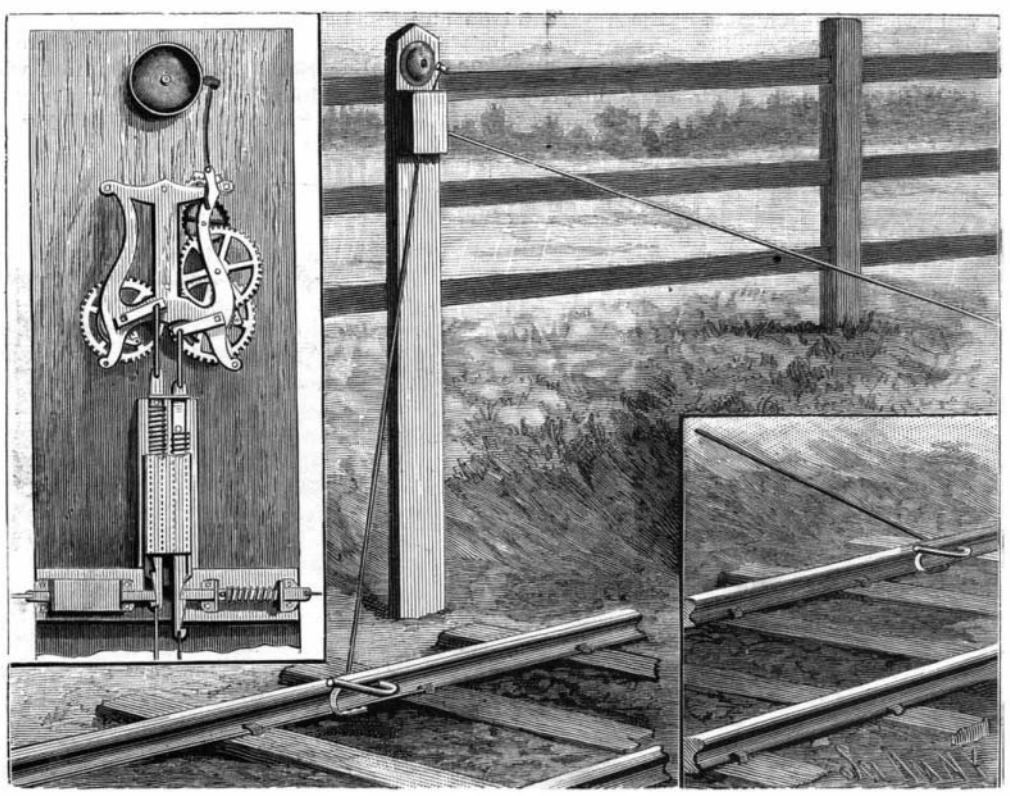
The improvement shown in the illustration is designed for application to paint brushes of all kinds, facilitating the working out of the coloring matter, and enabling the brush to be flattened as desired. It has been patented by Mr. Wm. H. Humphrey, of the United States Hotel, New York City. Fig. 1 is a view in perspective and Fig. 2 shows the bridle turned back in position for cleaning the brush. The bridle takes the place of the usual twine wound around the butt of the brush, and consists of two similar pieces or flaps, held at one end between the plug and the brush ferrule, the edges of the flaps having eyeleted perforations to be connected in pairs by cords. When the brush becomes worn the outer ends of the flaps with the outer cords may be cut off to give further flexibility, as this may be desired. Near the center of the flaps are other eyeleted perforations to receive a cord extending transversely through the bristles and back again, portions of the cord lying at each side of the center, and its ends being tied at one side. If the brush is to be round, the cord is left loose enough to permit the bristles to assume a cylindrical shape, but by tightening the cord the brush is flattened accordingly. Near the base of the flaps are perforations, through which the paint oozes when the brush is worked back and forth to free it of a certain color, but when the brush is to be thoroughly cleaned, the flaps are turned back, as shown in Fig. 2.



HUMPHREY'S PAINT BRUSH BRIDLE.

AN IMPROVED RAILWAY SIGNAL.

The illustration represents an improved means for actuating an audible or visible signal, to be located adjacent to a railway crossing, for indicating the approach of a train, the signal being operated by the train. The improvement has been patented by Mr. Owen C. Morris, of Phœnix, Md. The figure at the left shows the details of the signal-operating mechanism, adapted for connection with a rail of the track at either side of the crossing, the apparatus being inclosed in a suitable casing, attached to a post at the side of the track. The mechanism, by means of which an alarm is sounded on a bell or gong, is operated by two spring-actuated driving wheels, the shafts on which the wheels are mounted being rigidly connected at their outer ends with crank arms, pivotally connected with links extending to the upper ends of vertically movable slides in a casing which is shown partially broken away. Sleeved on the slides are spiral springs, whose lower ends abut against the lower end of the frame and their upper ends against lugs on the slides, so that as the latter are drawn down, the springs are compressed. The lower projecting ends of the slides are formed with stops adapted to be engaged by spring-pressed horizontal bolts, sliding in brackets, the outer end of one of the bolts being connected by cable or wire with a tripping lever located on the rail at some distance from the signal. These levers are so inclined that the wheels of a passing train, approaching the signal in one direction, will press the lever down and thus draw upon the wire or cable to withdraw the bolt, releasing the slide, and permitting the spring to force it up, thereby operating the clock mechanism to sound the alarm. As the train reaches the signal, a similar tripping lever on the rail is operated to draw down the slide, a wire extending from this lever to the bottom of the slide, which is now engaged and locked by the horizontal bolt, the device being then in readiness for the following train, the signal having been sounded from the time the first tripping lever was moved until the second one was reached. To prevent unauthorized persons or animals from operating the signals, C-springs of sufficient strength are placed under the tripping levers.



MORRIS' RAILWAY SIGNAL.

A Great Tableland 17,000 Feet High.

Captain Bower, of the Indian Staff Corps, has arrived at Simla from China, after a very remarkable journey across the Tibet tableland. He had with him, says *Nature*, Dr. Thorold, a sub-surveyor, one Pathan orderly, a Hindostani cook, six caravan drivers, and forty-seven ponies and mules. The Calcutta correspondent of the *Times*, who gives an account of the journey, says that Captain Bower, leaving Leh on June 14, crossed the Lanakma Pass on July 3, avoiding the Tibetan outpost placed further south. Journeying due east, he passed a chain of salt lakes, one of which, called Hor-Ba-Too, is probably the highest lake in the world, being 17,930 feet above the sea. Gradually working to the southeast, the explorer saw to the north a magnificent snowy range, with a lofty peak in longitude 83° and latitude 35°. After many weeks' travel over uplands exceeding 15,000 feet in height, where water was scarce and no inhabitants were to be seen, the party on September 3 reached Gya-Kin-Linchin, on the northern shore of Tengri Nor Lake, in longitude 91° and latitude 31°. This is within a few marches of Lhassa, and two officials from the Devi Jong, or temporal governor of Lhassa, met him here and peremptorily ordered him to go back. But he refused to return, and a compromise was effected, guides and ponies being provided on his agreeing to make a detour to the north in order to reach the frontier of Western China. He reached Chiamdo on December 31, only just succeeding in getting off the tableland before winter set in. He struck Bonvalot's route for a few miles when marching to Chiamdo. The country about this town is very fertile and well wooded. Three thousand of the monks of Chiamdo, who lived in fine monasteries, threatened to attack the party, but were deterred on learning that they carried breechloaders. Captain Bower arrived at Tarchindo, an outpost on the Chinese frontier, on February 10. The distance covered from Lanakma to Tarchindo was over 2,000 miles, all of which, save a few miles, has now been explored for the first time. The route for thirteen consecutive days lay over a tableland 17,000 feet high. Captain Bower is engaged in writing a report and completing his maps.

The Condensers of the Baltimore.

Recently on removing the tubes there was nothing in their appearance to indicate anything wrong, but it was found that a very light blow would break them across. The fracture showed a complete change in the material. A thin ring on the inside had the color and appearance of the brass of which the tubes were originally composed, but outside of this the rest of the tube was of a dull copper color without metallic luster. The whole phenomenon was so entirely different from the usual experience with condenser tubes, which have generally been considered indestructible when intelligently treated, that an explanation seems impossible. As far as can be learned, there has been trouble on nearly all the new ships with the copper pipes, and it is not confined to the American navy, but the English have had the same trouble. A correct explanation will be of great interest to all mechanical engineers. A chemical analysis of some of the defective tubes of the Baltimore is now in progress, and when it is completed it may throw some light on the subject.