

Fast Torpedo Boats.

A well-ordered and excellently maintained torpedo flotilla, replete in every detail, is absolutely essential to a navy which must be prepared to act offensively. For some time past the continental naval powers of any pretensions have been steadily pursuing a policy of adding to their respective flotillas—both in boats and “catchers” of exceptional speed—while in this country the construction of first-class torpedo boats has remained in abeyance since 1889. Consequently our fleet of torpedo boats is not what it should be. We are lamentably inferior in numbers to those of France, Italy, and Germany, and the few craft of this type attached to our fleet reserves that can lay any claim to be termed fast compare very unfavorably with the modern foreign torpedo boat.

All told, we have only ninety-five boats, and out of these there are only about eight or ten which could be depended upon to maintain a speed of 20 knots, while the persistent building policy pursued by rival European powers has placed them in possession of large numbers, in which the all-essential quality of speed has been the highest aim of their designers. Speeds exceeding 26 knots have been realized on the official trials of several torpedo boats now attached to the fleets of Germany and Italy, and quite recently a torpedo boat, measuring 152.5 ft. in length, with a displacement of 160 tons, was handed over to the Russian government from the works of Herr F. Schichau, Elbing, after having attained on her official trial trip of two hours' duration a mean speed of 26.5 knots. Such a speed as this has never yet been approached in any existing British torpedo boat, the fastest we possess at present being only capable of steaming 23 knots. The new building programme, however, authorizes the construction of ten first-class torpedo boats, which will be added to the navy during the present financial year. From what has transpired in connection with these vessels, we learn that they will have a length of 140 ft. and a breadth of 14.5 ft., and eight of the number are to be equipped with machinery capable of propelling them at a speed of 27 miles per hour. With regard to speed this rate is a creditable step in advance of anything previously aimed at in British torpedo boats, and in virtue of what has been accomplished in vessels constructed for other powers, there is no reason to doubt its realization. Even with the addition of these ten vessels, our strength in numbers will still compare unfavorably with other naval powers of the first rank. It becomes, therefore, necessary for the Admiralty to face this question, and to consider the advisability of adding a certain number of high-speed first-class boats to the British torpedo flotilla every year.—*Industries (London).*

Japanese Dentistry.

While Mr. Hubbard was minister to Japan, I visited that country and spent a pleasant week with him. One day I was troubled with the toothache, and Mr. Hubbard took me to a dentist and explained to the saddle-colored operator that I wanted the grinder extracted. I was placed in a bamboo chair and tilted slightly back. The dentist examined my teeth, talking volubly meanwhile to Uncle Sam's representative. Suddenly his thumb and forefinger closed on the troublesome tooth, and before I had the faintest idea of what was going to happen, he lifted it out and held it up before me, smiling at the same time that vacant smile peculiar to the children of the Orient. “You were waiting for the forceps, were you?” said Minister Hubbard with a laugh. “They don't use 'em here. Look at this. Here is a young Jap taking his first lesson in dentistry.” A twelve year old Japanese boy sat on the floor, having before him a board in which were a number of holes into which pegs had been tightly driven. He was attempting to extract the pegs with his thumb and forefinger. Mr. Hubbard explained that as the strength of this natural pair of forceps developed by practice, the pegs would be driven in tighter. After a couple of years at peg pulling the young dentist would graduate and be able to lift the most refractory molar in the same manner that he now lifted wooden pegs.—*St. Louis Globe-Democrat.*

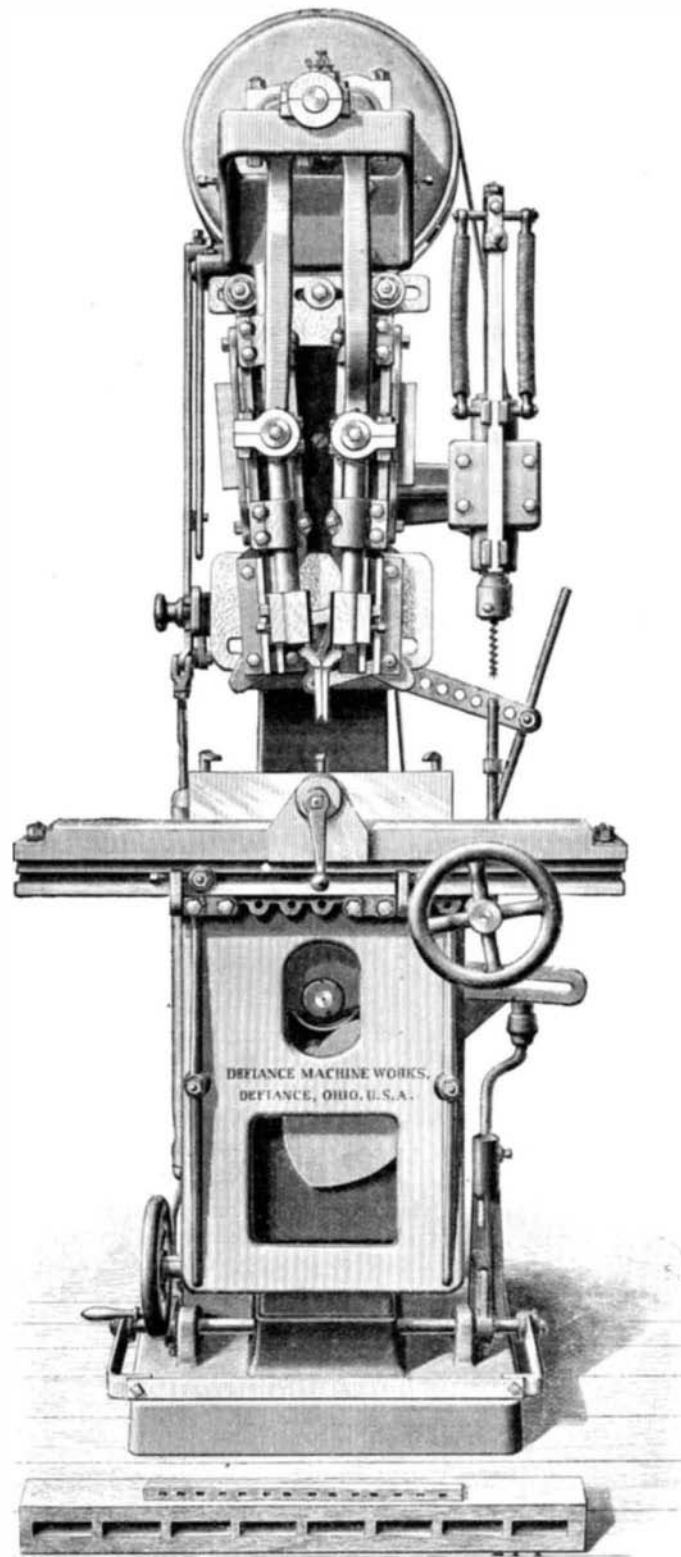
Better House Heater Needed.

In steam and hot water house heaters there will be a change of fashion soon, if one may judge from what is taking place in the domain of hot air apparatus. It is hardly to be conceived that with all the technical knowledge to be found among the present generation of heating contractors, they will continue to put in house-heating plants having the very poor devices for generating heat that are so almost universally turned out by Eastern makers. The essential ele-

ments of a good heater—a good fire pot to develop combustion, large and easily cleaned heating surfaces, together with capacity for different sorts of fuel—are never, to our knowledge, combined in any of the forms now prominently before the public. Until a form of house heater is put out that approximates to the good qualities of a power boiler, the question of the kind to buy will not be settled.—*American Architect.*

A DOUBLE CHISEL MORTISING AND BORING MACHINE.

The automatic double chisel mortising and boring machine shown in the illustration is the first one of its kind ever built, and is to be placed on exhibition at the coming World's Fair as something entirely novel. It is for cutting mortises in either hard or soft wood, from one-eighth to one and a half inches wide and from one-eighth to six inches long, such as re-



AN IMPROVED WOOD-WORKING MACHINE.

quired in carriage and wagon, furniture, agricultural and other shops. The driving power is at the top, and the two chisel bars are arranged side by side upon the front of the column. The boring apparatus is in an iron casing, which covers the gears, the auger being in line with the center of the chisels, so that the work has only to be moved laterally from one to the other. The table has a screw clamp to hold the work, the bed on which the table rests being gibbed to the frame and elevated to the chisels by a lifting cam operating on a friction roller. The friction clutch at the top of the machine is connected by foot lever, the weight of the foot upon the lever starting the chisel bars, and the work being gradually lifted until the full depth of cut is reached, when it remains stationary until the mortise is completed, and then descends, the feeding being automatic. The mortises may be made tapering in either direction, or parallel, or tapering at one end and perpendicular to the surface at the other end. This machine is manufactured by the Defiance Machine Works, Defiance, Ohio.

German Vestibule Trains.

Concerning the much talked of vestibule trains now running between Berlin and Cologne, Germany, and to which reference has already been made in the *Railroad Gazette*, the following additional particulars are given in the German papers: Each train is made up of six new cars, having four axles each. One of these cars is a combined mail and baggage car, four of them have each two first-class and four second-class compartments, and the remaining car has five second-class compartments and a porter's compartment. The mail and baggage car is coupled on immediately behind the engine, and is followed by the car with the five second-class compartments. The mail and baggage car is 56.7 ft. long, and the other cars measure 52.85 feet, the weight of the cars ranging between 29,000 and 29,300 kg. (63,800 and 64,900 lb.) each. The cars have side aisles, 1 meter (3.28 ft.) wide, and covered connecting platforms, so that one can readily pass from one end of a train to the other. Each first-class compartment has four numbered chairs, while each second-class compartment has six numbered seats arranged in the manner usual on German roads. The first-class compartments also have each a movable table, and bracket tables hung under the window sills. All the tables are covered with green cloth.

The porter's compartment is fitted up with cooking utensils, closets for supplies, etc., a refrigerator, tables, and other necessaries. Gas stoves are used for cooking. Each car has also a water closet and lavatory. Soap and towels can be obtained from the porter for a small consideration. The aisles and small ante-rooms contain collapsible chairs. Bottles containing drinking water and glasses are conveniently disposed. The cars are heated by steam and lighted by gas, and have electric call bells for the convenience of the passengers. Food of good quality and in some variety can be obtained from the porter at moderate prices. Extra seat tickets must be secured by the passengers in addition to the regular trip tickets, the extra charge being one mark (about 25 cents). These seat tickets can be obtained in advance only at the two terminals, Berlin and Cologne. The advance sale of these tickets is closed half an hour before the starting time. Thus, after many years, the American car system is beginning to take root in Europe. In the course of a half century or so it will be further extended.

“Advice” to a Boy.

In one of the large railroad offices in this country is a comparatively young man, who is at the head of a large department. When he entered the service of the company, five years ago, he was green and awkward. He was given the poorest paid work in the department. The very first day of his employment by the company, a man who had been at work in the same room for six years approached him and gave him a little advice. “Young fellow, I want to put a few words in your ear that will help you. This company is a soulless corporation, that regards its employes as so many machines. It makes no difference how hard you work, or how well. So you want to do just as little as possible and retain your job. That's my advice. This is a slave pen, and the man who works overtime or does any specially fine work wastes his strength. Don't you do it.” The young man thought over the “advice,” and after a quiet little struggle with himself he decided to do the best and the most he knew how, whether he received any more pay from the company or not. At the end of a year the company raised his wages and advanced him to a more responsible position. In three years he was getting a third more salary than when he begun, and in five years he was head clerk in the department; and the man who had condescended to give the greenhorn “advice” was working under him at the same figure that represented his salary eleven years before. This is not a story of a goody-goody little boy who died early, but of a live young man who exists in flesh and blood to-day, and is ready to give “advice” to other young men just beginning to work their way into business. And here it is: “Whatever thy hand findeth to do, do it with thy might.”—*Youth's Companion.*

Great Chicago to Have the Greatest Telescope.

By the munificence of Charles T. Yerkes, President of the North and West Chicago Street Railroads, the University of Chicago is to have a gigantic telescope. His instructions are to secure the largest and best telescope in the world, regardless of expense, and send the bill to him. This involves a donation of not less than half a million dollars, and will procure an instrument with a forty-five inch lens. The famous Lick lens is nine inches smaller in diameter.

The Chicago World's Fair.

The following interesting description of the present status of the Columbian Exposition shows what Englishmen think of the great enterprise :

The London *Times* correspondent at Chicago describes the exhibition buildings and grounds as in a promising condition. With few exceptions the great buildings are practically completed, the whole aspect of the Fair showing a state of preparation much further advanced than one would have supposed possible so far ahead of the opening day, which is yet seven months off—May 1, 1893. No room is left for doubt that everything will be ready, in buildings and grounds, by the opening day, and all danger of non-readiness is passed. Thousands of people go every day to the grounds and watch with interest the progress of the work. On fine Sundays as many as 15,000 have entered the gates. They pay a shilling apiece, and this source has already brought in more than £20,000.

The United States battleship, which has been built up from the bottom of the lake behind a protecting breakwater at the upper pier, is practically finished, and looks lifelike from all along the lake front, its turrets, stacks, and towers rising above the deck, and long guns pointing over bow and stern. Here will be made the government naval display. Almost alongside stands the solid-looking "Victoria House" of the British section, occupying an admirable place in the foreground of the Exposition, overlooking the lake, whose waters reach within a few feet of its doors. The first story is up and building progress is rapid. It is an English half-timber house of the sixteenth century, yellow terra cotta being largely used in the lower story, with red brick facing, and mullioned windows. The upper portion will be of half-timber construction, with overhanging and projecting gables. The building being in full view from all sides, each facade is treated architecturally. The plan forms three sides of a quadrangle, with the open side next the lake, inclosed by a raised terrace with balustrade. The interior will furnish offices for the British section, and the principal rooms will be fitted up with wall paneling and elaborate ceilings, like some of the best English country houses. Germany and Russia will also have old-fashioned houses.

The plan of the Fair embraces no fewer than 150 buildings of various capacities. Many of these are specially erected by States of the Union, or foreign countries or for private exhibits, the cost being defrayed outside of the general fund of the Exhibition. The following list of the chief buildings gives the dimensions of each, in feet, with the approximate area of floor and gallery space for exhibitors in acres, and also the cost of each :

Buildings.	Dimensions.	Space.	Cost.
Administration.....	262 x 262	45	£87,300
Manufactures.....	1,687 x 787	44	320,150
Machinery.....	842 x 494	17	210,150
Machinery Annex.....	551 x 490	6.2	
Machinery, machines and boiler.....	1,103 x 86	2.2	15,000
Agricultural.....	800 x 500	15	138,300
Agricultural Annex.....	550 x 312	4	
Electricity.....	690 x 345	9.3	82,700
Mining.....	700 x 350	8.5	53,300
Transportation.....	960 x 256	9.4	73,800
Transportation Annex.....	850 x 435	8.5	57,400
Horticultural.....	998 x 251	8	44,950
Fisheries.....	361 x 162	1.4	
Fisheries, two annexes.....	135 diameter	0.7	
Fine Arts.....	500 x 320	4.6	134,100
Fine Arts, two annexes.....	220 x 136	1.4	
Women's.....	398 x 199	3.3	27,600
United States.....	421 x 351	5.5	80,000
United States Battleship.....	348 x 69	6	20,900
Illinois.....	450 x 160	5	50,000
Forestry.....	528 x 208	2.6	18,050
Railway station.....	300 x 150	4	45,000
Railway station train shed.....	672 x 150	0.8	6,000
Dairy.....	200 x 94	4.3	20,000
Leather.....	625 x 150	2.5	14,000
Live stock.....	440 x 260	1	10,000
Saw mill.....	300 x 136	1	
Music hall.....	348 x 140	0.7	60,000
Casino.....	246 x 140	0.7	
Colonnade.....	600 x 60	0.9	
Pier.....	2,500 x 250	11.5	25,000

The total estimated cost is thus £1,592,800. Including live stock sheds, etc., there will be a grand total of over 232 acres of exhibition space and other accommodation for visitors.

Besides the buildings above mentioned, twenty-four of the States of the American Union (Illinois leading) are constructing special State buildings, of which seventeen are approaching completion and eight others are in process of erection. Buildings are also contemplated by the Pennsylvania Railroad and the White Star Steamship Line. There will be a Merchant Tailors' Building, a Children's Building, a Workingmen's Home, a building for *Puck*, an Indian School, Pump House and Oil House (both for exhibits), Cold Storage House, photographic building, extensive greenhouses, and sundry other structures, not large in themselves, but all of them in the aggregate covering about 60 acres and costing about £350,000. The United States, besides its large building and the naval exhibit on the battleship, is arranging for other smaller structures exhibiting a lighthouse, life saving station, weather bureau, and heliograph.

The respective buildings are attractive as well as colossal, and of themselves make a most noble display. In the aggregate they are estimated as taking 75,

000,000 ft. of timber in construction, representing ten square miles of forests, and also 20,000 tons of structural iron and steel. They are all of them covered with the composition of plaster, cement, and hemp, or similar fiber, known as "staff." The amount of this work upon them is equal to covering the wall of a four story building 15 miles long. The sculpture and decorations on the buildings are also chiefly of "staff," being first modeled in clay. There are altogether on the grounds and buildings forty-eight sculptured groups, and 103 other figures, all of heroic size. The chief statue is the "Republic," 60 feet high, and standing on a pedestal 40 feet high, at the entrance to the Basin, costing £5,000. The buildings and grounds are to be lighted by 5,000 electrical arc lights and 93,000 incandescent lights, there being 17,000 horse power provided for electric lighting out of the 24,000 horse power in the machinery building. This is ten times the electric lighting power provided at the last Paris Exposition, the whole electrical plant costing £200,000. Thus the Fair in all its departments is on the grand scale upon which the ambitious city of Chicago delights in doing everything.

The financial state of the enterprise is also satisfactory. The receipts so far, including paid up stock, £1,018,683, and Chicago's gift, £1,000,000, have amounted to £2,080,209, and the expenditure to about £1,980,000. The treasurer expects additional resources from stock installment payments, bonds, and the gift of Congress of \$2,500,000 in souvenir silver half dollars, which are to be sold, excepting some special coins, at double value, \$1 apiece. The bonds to be issued are \$4,000,000 sixes, which will chiefly be taken by the Chicago banks. All the receipts, property, and salvage of the Exposition are pledged for these bonds, and they are the only lien. The following is the total approximate balance sheet of the Exposition, present and prospective :

RECEIPTS.	
Paid upon capital stock.....	£1,100,000
Chicago bonds.....	1,000,000
United States half dollars.....	500,000
United States premiums thereon.....	500,000
Debenture bonds.....	800,000
	£3,900,000
Estimated gate receipts (admission 2s.).....	2,000,000
Concessions and privileges.....	700,000
Salvage.....	300,000
Total receipts.....	£6,900,000
EXPENDITURE.	
Construction and all other preparatory expenses.....	£3,750,000
Operating expenses.....	500,000
	£4,250,000
Surplus.....	£2,650,000

The aggregate investment in the Chicago World's Fair, without counting the individual expenditures of the exhibitors in preparing the display, is the following :

The Exposition Company.....	£4,000,000
The United States exhibit.....	280,000
The various States of the Union.....	1,320,000
Foreign nations.....	1,650,000
Total cost of the World's Fair.....	£7,250,000

The foreign interest taken in the fair is more universal than ever known in a previous exposition. The following list gives the nations and colonies participating, the amount of their appropriations, and the expenditures in addition to the appropriations that will be made :

Country.	Appropriation.	Additional.
Argentine Republic.....	£20,000	
Austria.....	20,460	£40,000
Belgium.....	11,400	10,000
Bolivia.....	6,000	
Brazil.....	120,000	
Colombia.....	20,000	
Costa Rica.....	30,000	
Denmark.....	13,400	10,000
Danish West Indies.....	240	
Ecuador.....	25,000	
France.....	146,680	100,000
Germany.....	160,000	100,000
Great Britain.....	58,200	20,000
Barbados.....	1,168	
British Guiana.....	5,000	
British Honduras.....	1,560	
Canada.....	20,000	20,000
Cape Colony.....	10,000	
Ceylon.....	13,120	10,000
India.....	6,900	75,000
Jamaica.....	4,867	
Leeward Islands.....	1,200	
New South Wales.....	49,615	
New Zealand.....	5,500	
Trinidad.....	3,000	
Guatemala.....	12,000	
Hawaii.....	40,000	
Honduras.....	8,000	5,000
Hayti.....	4,000	
Japan.....	5,000	
Liberia.....	126,000	50,000
Mexico.....	1,400	
Morocco.....	10,000	
Netherlands.....	30,000	
Dutch Guiana.....	20,000	
Dutch West Indies.....	2,000	
Nicaragua.....	1,000	
Norway.....	6,200	
Orange Free State.....	11,256	10,000
Paraguay.....	1,500	
Peru.....	20,000	
Russia.....	28,000	
Salvador.....	9,264	50,000
San Domingo.....	2,500	
Spain.....	5,000	
Cuba.....	2,800	
Sweden.....	5,000	
Uruguay.....	21,600	
	4,800	

The following is the allotment of space in square feet to the leading countries :

Country.	Space.	Country.	Space.
Austria.....	150,000	Japan.....	60,000
Belgium.....	120,000	Mexico.....	61,000
Denmark.....	20,000	Greece.....	1,000
France.....	250,000	Russia.....	100,000
Germany.....	250,000	Sweden.....	40,000
Great Britain.....	250,000	Norway.....	50,000
British Colonies.....	100,000	Italy.....	45,000
Canada.....	70,000	Spain.....	30,000

This makes about 1,600,000 square feet allotted to the leading foreign nations in the various buildings, besides extensive assignments of space on the grounds, where several are constructing buildings. The applications for space in the various departments are much larger than the available room, vast as it is. In the manufactures building there are applications for three times the space, and in several others for twice as much as the respective buildings contain. These countries will have buildings of their own : Great Britain, France, Germany, Russia, Italy, Austria, Canada, Ceylon, China, Colombia, Costa Rica, Ecuador, Guatemala, Hayti, Japan, Nicaragua, Norway, Sweden, and Turkey—19 in all. This is the first exposition that will have had exhibits from every colony of England and France. Concessions have been granted for the purpose of conducting theaters, shops, restaurants, and representations of native life to the following governments : Algeria, Austria, China, India, Dahomey, Egypt, Hungary, Pacific Islands, Italy, Japan, Morocco, Persia, Sandwich Islands, and Tunis.

The ruling power at the Fair is now President Harlow N. Higginbotham and the council of administration of four persons. It was found best thus to concentrate authority, and these gentlemen, with Director-General Davis and his staff of department chiefs, have accomplished the great results herein detailed, and are now making ready for the installation of exhibits. The Fair is working as a harmonious machine, and hence the speedy accomplishment of wonderful results ; and this may be expected to continue until the close of the vast enterprise. Mr. Higginbotham is the active partner in the great Chicago dry goods house of Marshall Field & Co., the most extensive "store" in America, and his business accomplishments and activity find a fine field in the Fair.

That a large number of visitors is expected is shown by the "nerve" of the man who has been awarded the "peanut concession." This bold individual pays £28,000 for the privilege of selling peanuts at the Fair. He pledges to pay the Fair 70 per cent of all gross receipts, no matter what he takes in, and this sum is not to be under £28,000. The European tide of travel to the Fair, judging from the inquiries made, will be large. The ease and quickness of a visit from England, through the celerity of modern steamship and railway travel, are shown by a recent case. A gentleman left Liverpool August 6 on the steamer *City of New York*, and, arriving, went to Chicago, spending two days there. He then came back to the seaboard and returned to England in the *City of New York*, sailing August 17, and arriving at Liverpool on the 23d, being about only 17½ days. This shows what may be done if pressed for time. This very active and enterprising city of Chicago is certainly preparing for the delectation of visitors from home or abroad what the late P. T. Barnum would have called "the biggest show on earth," and she will make it in all probability the crowning event of the coming year.

At the World's Fair it is intended to institute a grand tournament in all branches of sport, open to all nations for the championship of the world. The money will be provided by the authorities controlling the World's Fair, and a movement is on foot to get the athletes of England, Ireland, Scotland, and Wales to compete for championship honors. Among those who support the idea are the Duke of Fife, the Marquis of Lansdowne, the Marquis of Ripon, the Earl of Rosebery, Earl Spencer, the Earl of Derby, the Earl of Jersey, the Earl of Hopetoun, Lord Brassey, Lord Carrington, Lord Wenlock, Lord Harris, Lord Playfair, Lord Reay, the Bishop of London, Mr. A. J. Balfour, Mr. Chaplin, Sir R. Webster, Sir C. Dilke, Sir F. Leighton, Sir E. Grey, Mr. Froude, Professor Goldwin Smith, the Rev. Dr. Welldon, Mr. Quintin Hogg, and many others.

The matron of Chelsea Infirmary, Cale Street, S. W., with a view to rendering the exhibits in connection with nursing as complete as possible, invites the heads of all hospital and infirmary training schools for nurses, whose standard of training is not less than three years, to send, before December 1, a copy of the certificate they issue, and lend any badge or medal peculiar to their institution, or which may have been obtained for any special service rendered to the cause of nursing.

THE highest railroad in the United States is the Colorado Midland, at the Continental Divide—11,530 feet above the sea level.