Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN

Remit by postal or express money order, or by bank draft or check.

MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

The Scientific American Supplement is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contain. Is octavo pages, uniform in size with SciENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, 55.00 year, for the U. Canada or Maxico. 55.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country. See prospectus, last page. Combined Hates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to one address in U. S., Canada or Mexico, on receipt of seven dollars. To foreign countries within Postal Union, what dollars and Mily cents a year.

Building Edition.

Hallding Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN is a large and splendid illustrated periodical, issued monthly, containing floor plaus, perspective views, and sheets of constructive details, pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To builders and all who contemplate buildings this work is invaluable. Has the largest circulation of any architectural publication in the world.

Single copies 25 cents. By mail, to any part of the United States, Canada or Maxico, 25 da year. To foreign Postal Union countries, 25.01 a year. Combined rate for Building Edition with Scientific American, to one address, 25.01 a year. To foreign Postal Union countries, 25.01 a year. Combined rate for Building Edition, Scientific American and Supplement, 29.00 a year. To foreign Postal Union countries, 25.01 a year.

Spanish Edition of the Scientific American. LA AMERICA CIENTIFICA E INDUSTRIAL (Spanish trade edition of the SCIENTIFIC AMERICAN) is published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number of text America perfolusely illustrated, it is the finest scientific, industrial trade paper printed in the spanish language. It circulates throughout Cuba, the West Indies, Mexico Contral and South America, Spain and Spanish possessions—wherever the Spanish is any part of the world. Single copies 25 cents. See prospectus.

MUNN & CO.. Publishers.

MUNN & CO., Publishers, 361 Broadway, New York. The safest way to remit is by postal Order, express money order, or bank check. Make all remittances Payable to order of MUNN Readers are specially requested to notify the publishers in case of any fallure delay, or irregularity in receipt of papers.

NEW YORK, SATURDAY, JULY 1, 1893.

Contents.

(Lilustrated articles are marked with an asterisk.)	
Am. Ass. Ad. Science 7	Oak finish (5153)
Ant communities 10	Paint for iron and steel
Aphle, the whitepine 7	Patents granted, weekly record
Battle ship Victoria, the British 11	Planets, position of, in July
Bedstead, musical 9	Plants, variation in species of
Bicycling evils 10	Ratiway appliances, some new
Boller covering and coal con-	Recreation for middle age
sumption 11	Seal controversy, the great
Boiler setting (5154)	Shafting, square, of speet steel
Books and publications, now 12	Spiders, the slik of
Chapin, Ethan S 6	Stamp mill guide, Major's
Electric railway, an early plan 5	Steam navigation, early
Europe, to, in four days	Tar and asphalt for tanks
rente beel the great	Telegraph, the in China
Fela Aba Table 1	Tortoo it
Fair. the great	Keeling's
Fish-eating rodent, a 10	Traveling, fast
Fishes. sea, fecundity of 10	Vehicles, improved, Fincher's
Flour mill, the Litchfield 7	Velocity of projectiles, determin-
Foot race of French porters 4	ing
Glass writing and etching on	Victoria, war ship, sinking of the
(6152)	War boats, proposed submarine
Insects, local names of common 10	Water wheel, Frame's.
inventions recently patented 12	Wheat, "plug"
Light, the most costly known 11	Wheel, the great Ferris
Lubricator, Roller's* 5	Window larder, Ponisi's*
Nitroglycerine precautions 7	World a Fair notes

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 913.

For the Week Ending July 1, 1893.

Price 10 cents. For sale by all newsdealers.

PAGE

- VI. EDUCATIONAL.—Technical Education.—By MYER BLUMEN-FELD.—A prize essay delivered at the Hebrew Technical Institute in this city.—A plea for technical work.

 The Needs and Opportunities of a Great Technical College.—By Dr. R. H THURSTON.—What is done abroad and in the United States for technical education.—An outline of what should be done for the furtherance of science...
- VIII. MEDICINE AND HYGIENE.—Bright's Disease and Insanity.

 -The concluding summary of a recent article on this important subject.—Suggestive conclusions reached.
- IN METALLURGI —The Effects of Alloys on the Mechanical and Physical Properties of Metals.—By Prof. W. C. ROBERTS-AUSTEN.—A recent report to the Alloys Research Committee of the British Institution of Mechanical Engineers.—A valuable and suggestive paper.—Conclusion.
- Suggestive paper.—Conclusion.

 HORTICULTURE.—Horticulture at the Columbian Exposition.

 Notes of the present Exposition and of preceding horticultural shows, and of the gardening centers of America.

 The Columbian Exposition.—A saless.—The exhibit, in Chicago, of azaless of various kinds from all sources, with descriptions of the most interesting kinds.
- XI. MILITARY ENGINEERING.—The Waterways of our Country and their used in Military (Iperations.—By W. T. HILDRUP HOUSE.—The necessity of fortifying our coasts.—The dangerous exposure to an enemy of our coast cities.—A suggestive paper....... 14592
- XII. MISCELLANEOUS.—TheGolden Rose of Virtne.—A correction as to the presentation of this emblem......

SINKING OF THE BRITISH WAR SKIP VICTORIA.

On June 23, the British first-class battle ship Victoria, flagship of the Mediterranean Squadron, and carrying Vice-Admiral Sir George Tryon, K.C.B., was maneuvering off Tripoli. In the course of the maneuvers she came into collision with the British war ship Camperdown. The ram of the Camperdown struck the Victoria forward of the turret on the starboard side. In fifteen minutes the Victoria sank in eighteen fathoms of water. In sinking she turned bottom upward, and now lies in that position on the bottom. Announcing the disaster in the House of Commons, Mr. Gladstone said that there were 611 officers, seamen and boys, and 107 marines on board the ship. It was feared of this total of 718 souls, 430 had been lost. The Camperdown was injured in the collision and will require extensive repairs. The viceadmiral with a number of the officers were among the lost.

The Victoria had been several times illustrated and described by us, and on page 11 is a picture of the great ship, at one time the pride of the British navy. She was one of the most powerful battle ships in the world. Her length was 340 feet, beam 70, mean draught 26 feet 9 inches. The tonnage displacement was 10,470, the indicated horse power 14,244, speed developed in trial 17 3.10 knots. She was protected by a belt of compound armor, 18 inches thick, for about half the length of her hull, rising 2 feet 6 inches above the water. On the forward deck is the great turret, 17 inches thick, and inclosing the breeches of two 110 ton guns, mounted in parallel. These immense pieces of artillery carried 1,800 pound projectiles, the full charge of gunpowder being 960 pounds for each discharge. Aft of the turret came a strongly protected battery of 5 ton guns of 6 inch caliber, six projecting on each side through protected ports. Back of this structure came the stern gun-a 29 ton breech loader of 10 inch caliber. Triple expansion engines drove twin screws. She could carry a coal supply for 1,600 nautical miles, full speed, and at cruising speed for 7,000 miles. She was launched on April 9, 1887, from the Elswick yards of Armstrong, on the River Tyne; 150,000 persons witnessed the launch.

The above account is far from complete. Torpedo tubes, rapid-firing machine guns, a fighting mast, a most extensive system of hydraulic machinery, a heavily armored conning tower, and many other features in the ship cannot be more than mentioned within our limits. She was built to be the most powerfully equipped British war ship atloat. The Victoria was an example of the highest development of destructive capacity in a ship, and at the same time she illustrated the great weakness of these monuments of modern naval science. By accidental collision with a sister ship, in a quarter of an hour this vessel, representing £800,000 sterling of value, ignominiously turned itself. turtle and sank, bottom upward, carrying over 400 men with her. Not only was the weakness of an attacked ship shown, but the Victoria in being sunk with this dreadful loss of life was an instrument in showing the weakness of the involuntarily attacking vessel. It was only at the expense of damage to her own structure that the Camperdown, striking her sister ship below the armor, penetrated the iron hull with her ram. It is not long since the British ship Howe, with her bottom pierced by a rock, sank in the harbor of Ferrol, Spain.

The British turret ship Captain went down at sea. To descend from greater to less calamities, numerous instances can be cited of collisions between war ships and the minor vessels of commerce, the war ships suffering in the encounters. Even during the recent naval review on the Hudson, some damage was done to the ships of war by these collisions. It is evident that one point of construction is insufficiently provided for by modern naval engineers in war vessels. This is the rendering them unsinkable. They are necessarily topheavy, and their enormous weight and relatively liable to destruction by sinking and capsizing. The Allen & Co., Leadenhall Street, London, 1843.) efficacy of the ram as a weapon is also exemplified in points of weakness.

THE GREAT FAIR.

One of our weekly New York papers, justly noted for the excellence of its illustrations, prints the following as a caption to an editorial, "A Fair or a Fiasco?" Such articles have a tendency to do harm. If the Fair is a failure, the press of America will have its full share of blame to answer for. From the very first the papers all over the country, not even excepting those of Cook World's Columbian Exposition.

doubt many just causes for complaint, nearly all of ! ship."

which are now settled in a satisfactory manner, and even the photographic nuisance has been abated. After the Fair has been in operation over six weeks, or one quarter of the allotted period of exhibition, it really seems time to call a halt. It is now time to sit down and enjoy the rare treat which has been prepared at such cost of labor and money. Good natured banter or just criticism will not injure the Fair, but when every altercation at the gates is magnified into the proportions of an international episode it ceases to be a joke and tends materially to injure the Fair. The stories of extortion, quarrels among officers and the incomplete state of the Exposition have kept many thousands away during one of the most charming months in which the gates will stand open. Take the advice of the circus manager, who at the close of the afternoon performance said (in reference to the evening), "Come yourself and bring your children." Let it be said to the credit of the American people that the great Exposition, which has cost in round numbers \$34,000,000, is the grandest affair and the grandest success of our day and generation.

PROPOSED SUBMARINE WAR BOATS.

The Fifty-second Congress appropriated the sum of \$200,000 to build and experiment with a submarine torpedo boat. Nine bids for a submarine boat have been opened and referred to the Naval Ordnance Bureau for examination. Secretary Whitney asked twice for similar bids, so that this is really the third call which has been made for such a boat, and it is noteworthy that this call has brought out a larger number of bids than before. Only three out of the bids submitted contemplate the actual construction of the boat, for the advertisements for proposals were so worded that a poor inventor might submit his design, which, if accepted, the government would buy and contract for the construction of the vessel where they chose. There is no doubt a good submarine torpedo boat would do much to revolutionize modern naval warfare.

A surface torpedo boat, owing to the high speed required, must of necessity be built very light, which of course exposes it to the destructive fire of the machine guns, for the torpedo range is very short as compared with that of a naval gun. A submarine torpedo boat should have the advantage of being able to sink when approaching a vessel, so that the fire of the rapidfire guns can do no harm. A semi-submerged torpedo boat can be easily constructed with an armored turret, but the aim of inventors should be to produce a boar which can be instantly submerged, capable of maintaining a good speed under water, the course to be directed accurately, and to be able to fire the torpedo in an effective manner without danger to the boat

Early Steam Navigation.

The Liverpool Journal of Commerce has the following article on early steam navigation:

"With the increase of trade and population there is a progressive demand for steam navigation facilities. Without sufficiency of cargo and passengers to make a venture pay, or no help of a bounty or subsidy when traffic is sparse, financial success is out of the question. Prejudice or ignorance may, however, serve to stop progress.

"The Grand Treasurer of Spain did not believe in the safety of vessels propelled by steam, and he retarded the introduction of ships propelled by that agency. On the 17th of June, 1543, the La Santissima Trinadada, of 200 tons, was driven at the rate of one league per hour in the roadstead of Barcelona, in the presence of the Emperor Charles V., his son, Philip II., and several high dignitaries. The Treasurer, Ravage, believing that a boiler used for such a purpose would burst, denounced the enterprise, but paid the inventor, Don Blasco de Garragher, his small freeboard in many cases makes them peculiarly expenses. ('The Ship,' by Francis Steinitz. W. H.

"From several official sources it is made evident this deplorable affair, the Camperdown giving a that the practical application of the steam engine to practical example of the use, or rather misuse, of the marine propulsion was an accomplished fact three cenship as a quasi-projectile. A very thorough system of turies and a half ago. Seagoing steamers date from bulkheading, both longitudinal and transverse, seems the building of the James Watt by John Wood & Co., to be the only suggestable way of disposing of the in 1818, for the Leith and London trade. The Soho and Monarch were subsequently constructed for the same company. All three ships were built at Greenock, the birthplace of James Watt, and of William Laird, who settled in Liverpool and established a line of steamers from the Mersey to Dublin in 1822. The James Watt, Monarch, and Soho were purchased by the General Steam Navigation Company, and employed in their service for many years. Hull and machinery did their work admirably. They were built of wood, and had paddle wheels. All three were in existence a few years back as coal hulks. The James County, have poured forth their vials of wrath upon Watt was the first deep-water steamship built in the devoted head, not of a "Chicago Fair," but on the Europe. The Savannah, American-built boat, which came to Europe, can scarcely be called a machine-pro-During the first days of the Fair there were no pelled vessel, but may be classed as an auxiliary-driven