Elviras, and several others, and it is the proper selecting and combining of the fermented juices of these grapes, under carefully regulated conditions, that gives the high quality to the various still and sparkling wines made. The "Gold Seal" brand of champagne, prominently displayed in the company's exhibit, has been for many years a leading article of their production, and stands deservedly high in the wine trade and among connoisseurs throughout the country.

The still wines of this company are deserving of especial attention, all being made from the most careful selection of grapes, and they are vouched for as one "pure," which makes them particularly desirable with those who want pure goods, and desire to avoid adulterations. All stock is well aged, and sold at a low price, considering the quality.

The Late Hayward A. Harvey.

Hayward A. Harvey, the inventor of the Harveyized steel armor plate process, passed away August 29, at his home in Orange, N. J. Mr. Harvey was born in Jamestown, N. Y., January 17, 1824. His father was General Harvey, the inventor of the gimlet-pointed screw, the cam motion, and the toggle joint. Young Harvey entered the office of the New York Screw Company as draughtsman in 1844, he took charge of a wire mill at Somerville, N. J., in 1850, and in 1852 he became connected with the Harvey Steel and Iron Company, of which his father was president. In 1865 Mr. Harvey founded the Continental Screw Company, of Jersey City. The inventions of Mr. Harvey, up to this time, had nearly all been in the direction of automatic machinery: but he afterward devoted his energies to metallurgical processes, and in 1888 he took out his first patent on a process for treating steel. This invention has now made his name familiar all over the civilized world, and has added another word to our language.

The new process is, briefly, a method of hardening steel on the surface, or carbonizing it, and raising steel NEW YORK, SATURDAY, SEPTEMBER 16, 1893. of a low grade to a higher one. The first armor plate treated by the Harvey process was made in 1890. The Harvey Steel Company was organized in 1889, and works were established at Brill's Station, near Newark, on the Pennsylvania Railroad. Various improvements were introduced in the manufacture of armor plates, and to-day Harveyized steel armor plate stands without a rival. The tests made at the Indian Head Proving Grounds, a few weeks ago, proved conclusively that Harveyized steel plates are the best in the world. In a comparative test with English compound armor plate, Creusot all steel plate, and the regular United I States nickel-steel plate, the Harveyized plate proved to be better than any of the others. The construction of battleships has been modified by the introduction of Harveyized armor, and the new process is being adopted by the principal manufacturers of Europe. Mr. Harvey, in the course of a long and eventful life, had 125 patents granted to him.

The Lantern in Scientific Stage Effects.

Some new scientific stage effects were introduced into a recent performance of Wagner's Die Walkure, at the Grand Opera House, Paris. The scene where the sons of Wotan, mounted on steeds and brandishing their lances, are seen in the clouds, is described as very realistic. The foreground is wild and rocky, and the clouds are seen to scud across the sky. This effect is produced by projecting the image of a cloudy sky by an electric lantern on a curtain of translucent blue cloth. The continuous movement of the clouds for half an hour is produced by painting them on the edge of the disk of glass twelve inches in diameter, and rotating the edge past the lens of the lantern. Three lanterns II. are employed to blend the clouds. The wild cavalcade mi. of Wotan's heroes is produced by a line of mechanical horses, full sized, and carrying real performers. They are supported on a scaffolding, and drawn by means of a cable across the scene at a suitable elevation. The mounted men are strongly illuminated by the electric light, and thus rendered visible through the translucent curtain representing the heavens. The scene terminates by a conflagration, in which great flames run along the rocks, while thick fumes, reddened by Bengal fire, spread through the atmosphere. The flames are due to fulminating cotton, placed in advance on the rocks, and lit by the machinists. Lycopodium powder is also blown through holes in the stage. Weird cloud effects are produced by steam.

THE latest use for aluminum is for street car tickets. and it must be conceded that the metal is singularly x. adapted for the purpose. A Michigan street railway has just made its first issue of these light and ornamental tokens, which are about the size of a silver quarter dollar. One is round for the ordinary fare, the other octagonal for children. The adult's ticket is sold by the railroad company to the public at the rate of six for a quarter and the child's ticket at the rate of ten for a quarter. The company does not allow its employes, either conductors or motormen, to sell the tickets to the public, but disposes of them in \$10 lots to the several storekeepers who handle them exclusively.

Scientific American.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

185

182

TERMS FOR THE SCIENTIFIC AMERICAN.

The Scientific American Supplement is a distinct paper from the Scientific American. Supplement is a distinct paper from the Scientific American. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with Scientific American. Terms of subscription for Supplement, \$5.00 a year, for the U. S., Canada or Mexico. \$6.00 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 Ranges,—The Scientific American and Supplement will be sent for one year, to one address in U. S., Canada or Mexico, on receipt of sent adults. To foreign countries within Postal Union, cight dollars and fifty cents a year.

Bullding Edition.

Bullding Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN is a large and splendid illustrated periodical, issued monthly, containing floor plans, 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 building 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 Mexico, 22.50 a year. To foreign Postal Union countries, \$3.00 a year. Combined rate for Building Edition, Scientific American, to one address, \$5.00 a year. To foreign Postal Union countries, \$6.50 a year. Combined rate for Building Edition, Scientific American and Supplement, \$9.00 a year. To foreign Postal Union countries, \$1.00 a year.

Spanish Edition of the Scientific American. LA AMERICA CLEATIFICA E INDUSTRIAL (Spanish trade edition of the SCIENTIFIC AMERICAN) is published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number of La America is profusely illustrated. It is the finest scientific, industrial trade paper printed in the Spanish language. It circulates throughout Cuba, the West Indies, Mexico Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. \$3.00 a year, post paid to any part of the world. Single copies 25 cents. See prospectus.

MUNN & CO., Publishers,
361 Broadway, New York.

331 Broadway, New York.

The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO. Readers are specially requested to notify the publishers in case of any failure delay, or irregularity in receipt of papers.

Contents.

(Illustrated articles are marked with an asteriak.)

(Hidstrated articles are marked with an asterna.)	
Air cooling by underground pipe 183 Aluminum tickets. 178 Ang-Kor, ruins of . 182 Animal vocabularies. 183 Brake valve, Pelham's* 180 Brazing (5856). 189 Stattle stall, Aeberly's*. 181	Exposition, Columbian — Pens, Esterbrook, exhibit of Exposition, Columbian — Platinum exhibit, a costly. Exposition, Columbian — Vascelargest turned, at Exposition, Columbian — Wagoms heavy, of Chatham Mfg. Co.
Comet, the Rordame*	Exposition, Columbian—Notes Fair, Midwinter, at San Francisco
Diamond, a monster*	Fire engine, a bicycle Flowers, out, bow to preserve
Egg hatchings 188 Electrical binding post, Kohl's*. 181	Flowers, frozen, to ship
Electric trolley wire finder.	Gun, the Brown wire
Jones'* 187 Exposition, Columbian—Ameri-	Inventions, recently patented
can wines shown at, by Ur- bana Wine Co.*	Lantern. the, in stage effects
Exposition, Columbian—Awards at the	Lemon sirup
Exposition, Columbian—Cavern,	Money of the world
marvelous, Black Hills, represented at	Navy, French, increase of the Notes and queries
Exposition, Columbian — Drop	Olympia, the new cruiser Painting, seaside
forgings, exhibit of J. H. Wil- liams & Co.* 180	Patents granted, weekly record.
Exposition. Columbian—Filters, the McConnell. at the* 177	Plumbago as a lubricant
Exposition. Columbian—Grand	Pumps, well (5362)
South Canal. view on the* 185 Exposition, Columbian—Horse	Railroads, safety on
powers, etc., of A. W. Gray's Sons* 187	Sugar, Manila Tempering mainsprings
Exposition, Columbian — Pens	Valiant, the Vanderbilt yacht
and ink, Caw's exhibit of 181	Watch, a cheap*

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 924.

For the Week Ending September 16, 1893.

Price 10 cents. For sale by all newsdealers.

II. BOTANY.—Dragon's Blood.—Curious instorical notes of which known resin.

III. (HEMISTRY.—Attempt at a General Method of Chemical Synthesis.—By RAOUL PICTET.—Eight laws of chemical relation proposed as a base for a general method of chemical synthesis.

IV. CIVIL ENGINEERING.—Sinking a Siphon Trap.—A trap for condensed moisture, for use in steam heating systems.—21llus-

condensed moisture, for use in steam meaning experience trations.

The Ismuth of Corinth Canal.—Interesting ceremonies on the opening of the recently completed canal.

The Opening of the Corinth Canal.—Notes on the construction and engineering features of the great canal.—Sillustrations.

COLUMBIAN EXPOSITION.—Canada at the World's Columbian Exposition.—Interesting features of the exhibit of Canada in Chicago.—Illustration.

German Notes from the Chicago Exposition.—How the Fourth of July was celebrated at Chicago.—By a German observer.—Illustration.

Scientific Terms.—The philology of scientific words and their derivations.

XII. NAVAL ENGINEERING.—The British Protected Cruiser Graffon.—Recent trial of a British ship of high speed. 14762

XIII. PHYSICS.—Electrical and Light Vibrations.—The action of metallic gratings on electrical oscillations. 14765

XIV. TECHNOLOGY.—An Improved Method of Purifying Toluol, Benzol, etc.—By R. J. FRISWELL—An improvement in the manufacture of these coal-tar products. 14774

Apparatus for the Concentration of Sulphuric Acid.—The use of hot rases in direct contact with the surface of the acid to facilitate its concentration.—3 illustrations. 14773

Linseed Oil Varnish.—A simple and practical test for linseed oil The German Tar Distilling Industry.—Notes on thie industry as practiced abroad. 14762

The Sucking Up of Dangerous Liquids by Siphon.—An appara-

practiced abroad.

The Sucking Up of Dangerous Liquids by Siphon.—An apparatus for decenting sulphuric acid and similar liquids in factories.—
Illustration.

A CHANCE FOR AMERICAN CONTRACTORS.

In another column will be found the advertisement of the Public Works Department of Cairo, Egypt, in which bids are called for relating to the construction of certain street railways in that city and vicinity. Here would seem to be an opportunity for some of our enterprising contractors.

The administration of the Egyptian government under the English advisory auspices has been attended with great success. The financial condition of the country is stable and reliable. In all departments of the government valuable reforms have been made, and nearly everything is now conducted on modern methods. The Public Works Department of Egypt is especially noteworthy for its successful efforts in introducing new improvements. Splendid engineering works relating to the Nile irrigation have been constructed at vast cost, whereby the productive area of highly fertile lands has been greatly extended. Railways have been introduced, telephone and telegraph lines made universal, postal facilities increased and improvements of all kinds along the lines of modern progress brought in. The present proposals for tramway lines doubtless will be found worth looking into.

SAFETY ON RAILROADS.

Within a very recent period several fatal railroad accidents have been chronicled which were of a nature as to point to one conclusion—the futility of trusting to direct human agency for protection. A railroad is assumed to be of the highest standard when equipped with a block system. But as usually interpreted, the block system is far from affording absolute protection. It displays a danger signal and perhaps also a caution signal when a train is within a certain distance of the signal station last passed by it. A following train on the same track is supposed to be arrested by these signals, and the train in advance is thus protected. The signals may be entirely visual. Semaphores by day and colored lanterns by night may be employed. A bell may also be used, which will ring as long as the block in advance is occupied, this constituting an aural signal, or one addressed to the ear. Torpedoes may also be used.

Such is the block system, by which all first-class railroads are guarded. In some cases it is applied by operatives stationed in watch towers along the line of the road. In other cases the manipulation is entirely automatic, electricity, pneumatic and hydraulic power being employed to work the signals. The locomotive itself effects the changes of signals as it leaves one block and enters another. In any case its operation consists in working a signal system for the guidance of the engineer of the locomotive. If it is the watch tower system which is employed, the vigilance of the signalmen as well as of the engineer is an absolutely necessary factor for its working. If the automatic system is employed, then the engineer is the only one who is depended on. There seems to be less chance of error in the latter case.

The block system is designed to prevent collisions. Its defect is at once apparent. It relies absolutely on human agency to prevent accident. Its functions end with the display of a warning signal. It has been proposed to add to it an apparatus which would strike a lever or valve handle on the engine, thereby throwing the brakes into action or shutting off steam if the engine passed a danger signal. This appliance has not been adopted to any extent. Even the best block and signal system has proved so ineffective that when a train stops unexpectedly from any cause, an apprehension of rear end collision may always be felt. This has gone so far that it seems as if the passengers for their own safety should be directed to leave the cars in such contingencies.

In 1853, on the New Haven road, a very bad accident, resulting in the loss of 46 lives, occurred at South Norwalk. A drawbridge was open and the danger signal, announcing this fact, was properly shown. Yet the engineer of an express train ran by the signal and the train plunged into the gap. It was a fearful illustration of the point we have been making—the inefficiency of the human element in signal ing operations. The accident resulted in the passage of a law requiring every train to come to a full stop before crossing a drawbridge. This was certainly a confession of weakness. The law was next satisfied by the use of derailing switches at drawbridges. A derailing switch is one which, when opened, causes a train to leave the track and run along the surface until it stops. Such a switch connected with a drawbridge mechanism so as to be thrown into the derailing position when the bridge is open, will prevent the train from plunging through it. It eliminates completely the personal element and takes care of a danger point automatically. It represents the automatic stoppage of a train as contrasted with a simple danger signal designed to warn the engineer.

Throughout the whole system of railroad signaling runs the element of uncertainty. A train is brought to a stop between stations, owing to some accident. A signalman with a lantern by night or flag by day