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Conteuts.

(Illustrated articles are marked with an asterisk.)

| Air engine, new 3 |
|---|
| Amateur mechanics* 9 |
| American Institute of Architects 3 |
| American Institute of Architects 3 Architects, American Institute. 3 |
| Arctic winter characteristics of 3 |
| Aquarium (29) 3 |
| Balance attach. for valves* 3 |
| Aquarium (29) |
| Barometer, chemical (15) 3 |
| |
| Beetle, Hercules, the* 3 |
| Beetle, Hercules, the* Belts, capacity of (12) Business colleges* S83, 3 Carbons, to solder (20) |
| Business colleges* 383, 9 |
| Carbons, to solder (20) |
| Uninese women's feet* |
| Carbons, to solder (20): Chinese women's feet* Chisels, tempering. Colleges, business* |
| Colleges, business*383, |
| Engine, air, new |
| Engine, steam, single-acting |
| Eruption of Mauna Loa |
| exhibition of bathing appliances. |
| Feet, Chinese Women's |
| Bires—causes and prevention |
| Glass spinning and weaving |
| Glass spinning and weaving. Gun, submarine, new. Harbor at Montreal, the. Hercules beetle, the* Horse-power of turbines (12). Ice at high temperatures. |
| Haroulas boatle the* |
| Horse-nowar of turbines (19) |
| Log of high temporatures 9 |
| Too removing from reilroade* |
| Ice, removing from railroads* 3 Induction coll for transmitter.(14) |
| Induction coil small (96) |
| Induction coil, small (26) |
| Inventions miscellaneous 3 |

Inventions. recent
Knots, learning to tie
Leaves, variegation of. Mantis, the embrace of the Mechanics amateur*
Montreal, the harbor at.
Montreal dedender (9)
Nut. safety improved*
Packard's Business ('ollege* .883, Patents, decisions relating to Petroleum prospects
I hotos, to color (10).
Poultry raising, mechanical.
Railway, underground, London Safety nut, improved*
Schools of invention.
Screw-cutting foot lathe (11).
Steam heating, return pipe (17).
Steal, to tin (38). Steam heating, return pipe (17)...
Steel, to tin (38)
Submarine gun, new
Sun dial, to adjust, (27)
Telegraph insulator, new*.
Telegraph wires underground...
Valve, safety, improved*
Valves, balance attachment for*
Vanila, cinnamon, cocoanut.
Vennor's winter predictions...
Vessels, sunken, raising
Winter predictions, Vennor's...
Zinc, to amalgamate (23).

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 259.

For the Week ending December 18, 1880.

Price 10 cents. For sale by all newsdealers.

| | PAGE |
|--|--|
| I. ENGINEERING AND MECHANICS.—Frager's Water Meter. 31 | fig- |
| ures.—Vertical section, horizontal section, and plan | 4119 |
| Transmission of Power to a Distance.—Wire ropes —Compress | sed |
| air - Water pressure - Electricity | 4120 |
| air.—Water pressure.—Electricity | 4120 |
| The Hyana ba Flannah | 4100 |
| The Herreshoff Launch | 4121 |
| New Steering Gear. 2 figures.—Steam steering gear for Herr | es- |
| hoff launch | 4121 |
| | |
| H. TECHNOLOGY AND CHEMISTRYGlucose | 4196 |
| American Aanufacture of Corn Glucose | 4100 |
| The Conversions —Starch —Dextrine.—Complete glucose | 4120 |
| The conversions.—Starch —Detrine,—Complete glucose | 4120 |
| Depreciation of a Glucose Factory | 4120 |
| The Fire Risks of Glucose Factories and Manufactures | 4120 |
| Glucose Factory Fires and Ignitions | 4127 |
| The Hirsh Process. By ADOLF H. HIRSH —Improvement | in |
| the manufacture of sugar from Corn | 4127 |
| the manufacture of sugar from Corny Time in the Formation of Salts. By M. BERTHELOT. An Old Can of Preserved Mear. By G. W. WIGNER. | 4127 |
| An Old Can of Preserved Meat. By G. W. WIGNER | 4127 |
| Chemistry for Amateurs. 6 figures Reaction between nit | mio. |
| acid and iron.—Experiment with Pharaoh's serpents.—Formati | 07 |
| acid and non-maperiment with that add a scripents.—Formati | 011 |
| of crystals of todide of cyanogen.—Experiment with ammoniac amalgam.—Pyrophorus burning in contact with the air.—Gold le | Cal |
| amaigam.—Pyrophorus ourning in contact with the air.—Gold is | ar |
| suspended over mercury | 4128 |
| Carbonic Acid in the Atmosphere 2 figures. On Potash Fulling Soaps By W. J. MENZIES Photography of theInvisible. | 4129 |
| On Potash Fulling Hoaps. By W. J. MENZIES | 4129 |
| Dhotography of the Invisible | |
| FIIOMKRADILY OF MIGHTAININE | 4 134 |
| Finding raphy of the find is the finding raphy of t | 4134 |
| | |
| III. ELECTRICITY, LIGHT, HEAT, ETCExhibition of Gas a | nd |
| III. ELECTRICITY, LIGHT, HEAT, ETC.—Exhibition of Gas a | nd 4125 |
| III. ELECTRICITY, LIGHT, HEAT, ETC.—Exhibition of Gas a | nd 4125 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow Electric Light in the German Navy. 1 illustration. Armor Frients Friedrich Karl and Sachen — Dispatch Roat Grille as | nd 4125 red |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow Electric Light in the German Navy. 1 illustration. Armor Frients Friedrich Karl and Sachen — Dispatch Roat Grille as | nd 4125 red |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow Electric Light in the German Navy. I illustration. Armor Frigates Friedrich Karl and Sachsen.—Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about. Gas and Electricity.—Gas as Fuel.—G | nd 4125 red ind 4130 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow Electric Light in the German Navy. I illustration. Armor Frigates Friedrich Karl and Sachsen.—Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about. Gas and Electricity.—Gas as Fuel.—G | nd 4125 red ind 4130 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow Electric Light in the German Navy. I illustration. Armor Frigates Friedrich Karl and Sachsen.—Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about. Gas and Electricity.—Gas as Fuel.—G | nd 4125 red ind 4130 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow Electric Light in the German Navy. I illustration. Armor Frigates Friedrich Karl and Sachsen.—Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about. Gas and Electricity.—Gas as Fuel.—G | nd 4125 red ind 4130 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates. A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor | nd 4125 red und 4130 das 4130 e's 4131 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates. A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor | nd 4125 red und 4130 das 4130 e's 4131 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.—Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By ROBERT WARD. Photophonic Experiments of Prof. Bell and Mr. Tainter. By | nd 4125 red 4130 las 4130 e's 4131 A. |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.—Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By ROBERT WARD. Photophonic Experiments of Prof. Bell and Mr. Tainter. By | nd 4125 red 4130 las 4130 e's 4131 A. |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.—Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By ROBERT WARD. Photophonic Experiments of Prof. Bell and Mr. Tainter. By BREGUET. Distribution of Light in the Solar Spectrum. By J. MACE a | and 4125 red and 4130 fas 4130 e's 4131 4132 and |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates. A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By ROBERT WARD. Photophonic Experiments of Prof. Beil and Mr. Tainter. By BREGUET Distribution of Light in the Solar Spectrum. By J. MACE a W. NICATI. | and 4125 red and 4130 re's 4131 A. 4132 and 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.—Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates. A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By Robert Ward. Photophonic Experiments of Prof. Bell and Mr. Tainter. By BREQUET. Distribution of Light in the Solar Spectrum. By J. MACE a W. NICATI. Mounting Microscopic Objects. | and 4125 red and 4130 re's 4131 4132 and 4132 4132 4132 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Tornedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates. A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By ROBERT WARD. Photophonic Experiments of Prof. Bell and Mr. Tainter. By BREGUET Distribution of Light in the Solar Spectrum. By J. MACE a W. NICATI. Mounting Microscopic Objects. New Sun Dial. By M. GROOTTEN. 1 figure. | and 4125 red and 4130 re's 4131 4132 and 4132 4132 4132 4132 4132 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.—Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates. A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By Robert Ward. Photophonic Experiments of Prof. Bell and Mr. Tainter. By BREQUET. Distribution of Light in the Solar Spectrum. By J. MACE a W. NICATI. Mounting Microscopic Objects. | and 4125 red and 4130 re's 4131 4132 and 4132 4132 4132 4132 4132 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Gnates. A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By ROBERT WARD | nd 4125 red and 4130 res 4130 re's 4131 A. 4132 nd 4132 4132 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Gnates. A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By ROBERT WARD | nd 4125 red and 4130 res 4130 re's 4131 A. 4132 nd 4132 4132 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates. A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By ROBERT WARD. Photophonic Experiments of Prof. Bell and Mr. Tainter. By BREGUET Distribution of Light in the Solar Spectrum. By J. MACE a W. Nicati. Mounting Microscopic Objects. New Sun Dial. By M. GROOTEN. 1 figure. Antoine Cesar Becquerel, with portrait. IV. HYGIENE AND MEDICINE.—On the Etiology of the Carbundar Disease. By L. PASTEIR. assisted by CHAMBERLAND a | nd 4125 eed ind 4130 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By Robert Ward. Photophonic Experiments of Prof. Beil and Mr. Tainter. By BREQUET. Distribution of Light in the Solar Spectrum. By J. MACE a W. NICATI. Mounting Microscopic Objects New Sun Dial. By M. GROOTTEN. 1 figure. Antoine Cesar Becquerel, with portrait. IV. HYGIENE AND MEDICINE.—On the Etiology of the Carbung Lar Disease. By L. PASTEIR, assisted by Chamberland a contract of the action of the act | nd 4125 eed ind 4130 sas 4130 ee's 4131 4132 4132 4132 4132 4132 4132 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By Robert Ward. Photophonic Experiments of Prof. Beil and Mr. Tainter. By BREQUET. Distribution of Light in the Solar Spectrum. By J. MACE a W. NICATI. Mounting Microscopic Objects New Sun Dial. By M. GROOTTEN. 1 figure. Antoine Cesar Becquerel, with portrait. IV. HYGIENE AND MEDICINE.—On the Etiology of the Carbung Lar Disease. By L. PASTEIR, assisted by Chamberland a contract of the action of the act | nd 4125 eed ind 4130 sas 4130 ee's 4131 4132 4132 4132 4132 4132 4132 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By Robert Ward. Photophonic Experiments of Prof. Beil and Mr. Tainter. By BREQUET. Distribution of Light in the Solar Spectrum. By J. MACE a W. NICATI. Mounting Microscopic Objects New Sun Dial. By M. GROOTTEN. 1 figure. Antoine Cesar Becquerel, with portrait. IV. HYGIENE AND MEDICINE.—On the Etiology of the Carbung Lar Disease. By L. PASTEIR, assisted by Chamberland a contract of the action of the act | nd 4125 eed ind 4130 sas 4130 ee's 4131 4132 4132 4132 4132 4132 4132 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By Robert Ward. Photophonic Experiments of Prof. Beil and Mr. Tainter. By BREQUET. Distribution of Light in the Solar Spectrum. By J. MACE a W. NICATI. Mounting Microscopic Objects New Sun Dial. By M. GROOTTEN. 1 figure. Antoine Cesar Becquerel, with portrait. IV. HYGIENE AND MEDICINE.—On the Etiology of the Carbung Lar Disease. By L. PASTEIR, assisted by Chamberland a contract of the action of the act | nd 4125 eed ind 4130 sas 4130 ee's 4131 4132 4132 4132 4132 4132 4132 4132 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By ROBERT WARD. Photophonic Experiments of Prof. Bell and Mr. Tainter. By BREQUET. Distribution of Light in the Solar Spectrum. By J. MACE a W. Nicati. Mounting Microscopic Objects New Sun Dial. By M. GROOTTEN. 1 figure. Antoine Cesar Becquerel, with portrait. IV. HYGIENE AND MEDICINE.—On the Etiology of the Carbunc lar Disease. By L. PASTEUR. assisted by CHAMBERLAND a ROUX. An extremely valuable investigation of the natu causes, and conditions of animal plagues. Report on Yellow Fever in the U.S. Steamer Plymouth. By t Surgeon-General in U.S. Navy. | nd 4125 end 4130 has 4130 has 4131 h. 4131 h. 4132 h. 4132 eu- nd re, 4133 he 4134 he 4134 |
| III. ELECTRICITY. LIGHT, HEAT, ETC.—Exhibition of Gas a Electric Light Apparatus, Glasgow. Electric Light in the German Navy. 1 illustration. Armor Frigates Friedrich Karl and Sachsen.— Dispatch Boat Grille, a Torpedo Boat illuminated by Electric Light. Interesting Facts about Gas and Electricity.—Gas as Fuel.—G for Fire Grates A New Electric Motor and its Applications. 6 figures. Trouv New Electric Motor On Heat and Light. By Robert Ward. Photophonic Experiments of Prof. Beil and Mr. Tainter. By BREQUET. Distribution of Light in the Solar Spectrum. By J. MACE a W. NICATI. Mounting Microscopic Objects New Sun Dial. By M. GROOTTEN. 1 figure. Antoine Cesar Becquerel, with portrait. IV. HYGIENE AND MEDICINE.—On the Etiology of the Carbung Lar Disease. By L. PASTEIR, assisted by Chamberland a contract of the action of the act | nd 4125 end 4130 has 4130 has 4131 h. 4131 h. 4132 h. 4132 eu- nd re, 4133 he 4134 he 4134 |

V. ART. ARCHITECTURE, ETC.—Artists' H mes. No. 7. Sir Frederick Leighton's House and Studio. 10 figures. Perspective, plan,

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FIRES-CAUSES AND PREVENTION.

insurance companies earnestly endeavoring to make it plain think them to be. to the public how fires should be guarded against, or most effectually localized and controlled when once started.

During the fall, or from "lighting up" time till about New Year's day, more fires occur ordinarily than in any most general causes of conflagrations—as in the lighting and heating of houses, factories, etc., where this had not been after the first of the year the number of fires is greatly diminished, the lighting and heating arrangements having obvious defects would be remedied. While it may readily be conceded that the utmost care of the owner of property could not totally prevent great average losses from fire—for the greater the holdings the more must the proprietor trust to the oversight of others—it is evident that the above facts indicate the necessity of more strenuous precautions at this season. Gas pipes and fittings should then be tested; fur nace flues and settings looked to; stove, heater, and grate fixtures and connections examined—and in all these particulars the scrutiny should be most closely directed to parts or dinarily covered up or out of sight, so that any defect or weakness from long disuse may be exposed. When to the above causes of fires we have added the extremely fruitful one found in the extensive use of coal oil within a few years past, we have indicated the most common sources of conflagrations of known origin. An English authority gives the percentages of different causes of 30,000 fires in London, from 1833 to 1865, as follows: Candles, 11.07; curtains, 9.71; flues, 7.80; gas, 7.65; sparks, 4.47; stoves, 1.67; children playing, 1.59; matches, 1.41; smoking tobacco, 1.40; other known causes, 19.40; unknown causes, 32.88. The foregoing figures do not give the percentage of incendiary fires, and later statistics would, no doubt, show vastly more fires from the use of kerosene than are here attributed to candies

The prevention of fires, and the best means of minimizing the loss when they do occur, are topics which cover a wide field, and a collection of the literature on the subject would make a very respectable library. As the question presents jitself to-day, it may well be doubted whether the general practice of large property holders of insuring all their possessions does not tend to lessen the constant vigilance which sands of merchants never mean to keep a dollar's worth of do so as far as they are able. It does not follow but that the larger portion of both merchants and manufacturers exercise what the law will fully decide is "due vigilance" in erick Leighton's House and Studio. 10 figures. Perspective plan.
elevation, details, etc.

10 figures. Perspective plan.
127
elevation, details, etc.

128
Initials by Elseniohr and Weigle, in Stuttgart. Full page.

129
Initials by Elseniohr and Weigle, in Stuttgart. Full page.

120
Initials by Elseniohr and Weigle, in Stuttgart. Full page.

121
It by may not suffer from the carelessness of a neighbor; it velocity, t = t wave length, and t = t velocity, t = t wave length, and t = t velocity, t = t wave length, and t = t velocity, t =

to keep up to the mark in the introduction of every improvement to ward off fires or diminish their destructiveness.

The progress made in this department during recent years has been great. The almost universal use of steam has been attended by the fitting up of factories with force pumps, hose, and all the appliances of a modern fire brigade; dangerous rooms are metal sheathed, and machinery likely to cause fire is surrounded by stationary pipes from which jets of water may be turned on instantaneously from the outside; stores and warehouses have standing pipes from which every floor may be flooded with water under pressure, and the elevators, those most dangerous flues for rapidly spreading a fire, are either bricked in entirely or supposed to be closed at every floor. The latter point, however, is sometimes for gotten, as sea captains forget to keep the divisions of their vessels having watertight compartments separate from one another; the open elevator enlarges a small fire as rapidly as the open compartment allows the vessel to sink.

With the best of appliances, however, discipline and drill on the part of the hands, in all factories, is of prime importance. It is always in the first stages of a fire that thoroughly efficient action is necessary, and here it is worth a thousandfold more than can be any efforts after a fire is once It is estimated that the total annual losses of insured pro- thoroughly started. Long immunity is apt to beget a feeling perty by fire, throughout the world, average nearly two of security, and the carelessness resulting from overconfihundred million dollars. Add to this the annual destruction dence has been the means of destroying many valuable faction of uninsured property, and we should probably have a tories which were amply provided with every facility for total amounting to quite double these figures. How great their own preservation. The teachers in some of the public the loss, how severe the tax upon the productive industry schools of New York and Brooklyn, during the past year, of mankind, this enormous yearly destruction amounts to, set an example which some of our millowners might profitwill come home to the minds of most readers more directly ably follow. There have been cases when, from a sudden if we call attention to the fact that it just about equals the alarm of fire, children have been crushed in their crowding value of our total wheat crop during a year of good yield. to get out of the building. The teachers, in the instances And it is a direct tax upon productive industry everywhere, referred to, marched their children out, under discipline, as because, although here and there a nominal loser, fully in- if there had been a fire. Let owners of factories try some sured, has only made what is sometimes called "a good such plan as this, by which workmen may be called upon to sale" to the companies holding his risk, this is only a way cope with an imaginary fire, and many of them will, we venof apportioning the loss whereby the community at large be- ture to say, find means of improving their present system or come the sufferers. Thus it is that we find all ably-managed appliances for protection, elaborate as they may at present

WHAT IS LIGHT?

If on opening a text book on geology one should find stated the view concerning the creation and age of the earth other portion of the year. This fact points to some of the that was held a hundred years ago, and this view gravely put forward as a possible or alternative hypothesis with the current one deducible from the nebula theory, one would necessary during the summer months. It is also found that be excused for smiling while he turned to the title page to see who in the name of geology should write such stuff. Nevertheless this is precisely similar to what one will find been subjected to a period of trial during which their most in most treatises on physics for schools and colleges if he turns to the subject of light. For instance, I quote from a book edited by an eminent man of science in England, the book bearing the date 1873.

> "There are two theories of light; one the emissive theory; . the other, the vibratory theory;" just as if the emissive or corpuscular theory was not mathematically untenable sixty years ago, and experimentally demonstrated to be false more than forty years ago. Unless one were treating of the history of the science of optics there is no reason why the latter theory should be mentioned any more than the old theory of the formation of the earth. It is not to be presumed that any one whose opinion is worth the asking still thinks it possible that the old view may be the true one because the evidence is demonstrable against it, yet while the undulatory theory prevails there are not a few persons well instructed otherwise who still write and speak as though light has some sort of independent existence as distinguished from so-called radiant heat; in other words, that the heat and light we receive from the sun are specifically different.

A brief survey of our present knowledge of this form of energy will help to show how far wrong the common conception of light is. For fifteen years it has been common to hear heat spoken of as a mode of molecular motion, and sometimes it has been characterized as vibratory, and most persons have received the impression that the vibratory motion was an actual change of position of the molecular in space instead of a change of form. Make a ring of wire five or six inches in diameter, and, holding it between the thumb and finger at the twisted ends, pluck it with a finger of the other hand; the ring will vibrate, have three nodes, and will give a good idea of the character of the vibration that is the most essential requisite in preventing fires. Thou-constitutes what we call heat. This vibratory motion may have a greater or less amplitude, and the energy of the vibra goods in store or warehouse that is not fully covered by in-tion will be as the square of that amplitude. But the vibratsurance, and they make this cost a regular charge upon their ing molecule gives up its energy of vibration to the surbusiness as peremptorily as they do the wages paid the hands rounding ether; that is to say, it loses amplitude precisely in their employ. But few manufacturers can so completely as a vibrating tuning fork will lose it. The ether transmits cover their risks by insurance, yet a large portion of them the energy it has received in every direction with the velocity of 186,000 miles per second, whether the amplitude be great or small, and whether the number of vibrations be many or few. It is quite immaterial. The form of this the care of the property so insured, but it is evident that in energy which the ether transmits is undulatory; that is to most cases the thoughtfulness is much less complete—the say, not unlike that of the wave upon a loose rope when care wonderfully lacking in personal supervision—as com- one end of it is shaken by the hand. As every shake of the pared with what would be the case were each one his own hand starts a wave in the rope, so will every vibration of a insurer. Of course, this in no way casts a doubt upon the part of the molecule start a wave in the ether. Now we general policy of business men being amply insured, but in have several methods for measuring the wave lengths in fact shows the greater necessity why they should be so, that ether, and we also know the velocity of movement. Let v =