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Contents.

(Illustrated articles are marked with an asterisk.)

Archaeological news, 235; Athens, excavations at, 235; Bath, shower, a velocipede, 235; Books, new, 235; Buddha, birthplace, 235; Carbrake adjuster, Downings', 235; Calendar, the Gregorian, 235; Copyright law amendments, 235; Death, real and apparent, 235; Die head, the Gardner's, 235; Electric motor 64, 231; Electric transmission of water power, 231; Exploration in Tanganyika, 231; Field glass, a new, 235; Gems of quartz origin, 235; Government, the, and patentees, 235; Inventions recently patented, 235; Inventors, a bill to protect, 235; Iowa, first-class battleship, 235; Lathe, a spoke and handle, 235; Locomotive, Old Ironsides, 1837, 233; Locomotive, Sandusky, 1837, 233; Museum, the Field Columbian, 233; Naval officers, patents of, 233; Notes and queries, 236; Observatory, the Yerkes, 235; Paints, coal tar (7144), 236; Patents granted, weekly record of, 236; Patents, the new commissioner of, 236; Phonograph, a toy, 230; Physics, a new discovery in, 227; Railroad train record, fast, 230; Railways in Chile, 231; Safety pin, Chilton's, 230; Science notes, 231; Telescope, great, Yerkes Observ-atory, 235; Tomato preserving in Italy, 235; Tunnel, the Simpson, 227

TABLE OF CONTENTS OF Scientific American Supplement No. 1110.

For the Week Ending April 10, 1897.

Price 10 cents. For sale by all newsdealers.

I. AERONAUTICS.—The Motor Car in Excelsis.—A curious article on an aerial motor and its uses in war.—1 illustration. 17739
II. ARCHITECTURE.—Schliemann's Mausoleum in Athens.—A description of the beautiful mausoleum in the famous Greek cemetery to the explorer's memory.—1 illustration. 17743
III. AUTOMOBILES.—Gasoline and Petrol Carriages.—Four typical electric vehicles of this description exhibited at the recent exhibition in Paris.—4 illustrations. 17739
IV. BIOLOGY.—Mirror Writing.—The relations of left hand writing to the nerves.—A very curious investigation, with interesting deductions. 17749
V. CIVIL ENGINEERING.—Tests of Concrete Wire Flooring.—A test for strength and resistance to heat of this new type of flooring. 17738
VI. EDUCATION.—Technical Education in Europe.—By C. P. Brooks.—Continuation of this authoritative article, telling what is being done in England in the line of technical education. 17745
VII. GEOLOGY.—Fossil Bogs and Migratory Mosses.—By Dr. G. Archie Stockwell.—An interesting article on these extraordinary catastrophes.—First installment of an elaborate article. The Grotto of Montbe.—A most interesting research into the contents of a great French cave.—2 illustrations. 17747
VIII. HISTORY OF SCIENCE.—A Convent Arm Chair for the lame.—A curiosity of old times.—A chair moving on five wheels for invalids.—1 illustration. 17737
IX. MECHANICAL ENGINEERING.—Milling Machine for Test Specimens.—A contribution to the testing of heavy metallurgical samples.—The powerful machine for preparing the test pieces.—1 illustration. 17738
X. MEDICINE AND HYGIENE.—Milk as a Disease Carrier.—The regulation of milk traffic. 17750
XI. METALLURGY.—Note on Ferrumanganese. 17744
XII. METEOROLOGICAL SCIENCE.—The Famine in India.—Affecting account and historical article on the pressure exerted by the air. Note on Atmospheric Temperature at an Elevation of Nearly Nine Miles. 17750
XIII. MINERALOGY.—The Jewels of Royalty.—A valuable article by the celebrated gem expert Mr. George F. Kunz, on the great jewels of the world. 17744
XIV. MISCELLANEOUS.—Selected Formulae. 17745
XV. NATURAL HISTORY.—Kangaroos and Their Young.—A marvellous of Australia described and illustrated.—1 illustration. 17746
XVI. NAVAL ENGINEERING.—The Newest Vessels of the German Navy.—An interesting description of two typical vessels designed by the chief constructor of the German navy.—2 illustrations. 17742
XVII. PHOTOGRAPHY.—Green Leaves as Photographic Plates.—A curiosity in photography.—Its relation to botany. 17744
XVIII. RAILROAD ENGINEERING.—Locomotive Engines on the Austrian State Railways.—A compound express engine.—A beautiful example of Austrian practice.—1 illustration. 17738
XIX. SOCIAL SCIENCE.—The Famine in India.—Affecting account of the conditions and aspect of the country and people.—3 illustrations. Note on the Foreign Element in France and on Frenchmen Abroad. 17743
XX. TECHNICAL DRAWING.—Making Rubber Stamps.—An excellent description of this operation.—A long felt want supplied.—1 illustration. Soluble Siccatives.—The use of lead and manganese soaps as driers in varnishes and paints. 17741
Note on Persian Beet Root Sugar. 17743

A BILL TO PROTECT INVENTORS.

A bill has recently been introduced into Congress which is designed to put a stop to the "Lottery System" as applied to the patent practice.

Senator Hansbrough has introduced the following bill into the United States Senate:

Section 1.—That hereafter it shall be unlawful for any person or persons, firm or corporation, engaged in procuring and prosecuting patent claims to offer or award to their business correspondents or clients any gift, prize, or chance to win one, medal of honor, certificate of stock, or any other article or thing of real or supposed value, intrinsic or otherwise; and any person or persons violating the provisions of this act shall be deemed guilty of a misdemeanor, and on conviction thereof shall for each offense be punished by a fine of not less than \$500 and not more than \$1,000, or by imprisonment at hard labor for not less than six months nor more than one year.

Sec. 2.—That all applications for patents which may hereafter be filed by or through an attorney, or any person representing himself as such, shall be accompanied by an affidavit of such attorney or person that he has not violated the provisions of the first section of this act, and that false swearing thereto shall constitute perjury.

The granting of a valid patent by the government is properly regarded as an ample reward for a deserving invention, and one that is satisfactory to most inventors. The bill is so explicit in the description of the abuses it is intended to correct that further comment is unnecessary.

THE NEW COMMISSIONER OF PATENTS.

Hon. Benjamin Butterworth, of Ohio, has been nominated by President McKinley as Commissioner of Patents to succeed Commissioner Seymour. Mr. Butterworth was fourteen years a representative in Congress from Ohio, and has been for many years prominent in official and social circles in Washington. He was formerly Commissioner of Patents under President Arthur, from November 1, 1883, to March 23, 1885. During some years past he has made Washington his place of residence, and has built up a large law practice there, devoting his attention particularly to patent law. His preparation, therefore, has been an ideal one for satisfactorily filling this important office with great advantage to inventors and to the country. We congratulate the President in appointing to this important office a gentleman of such attainments and such unusual training for the position.

RELATION OF THE GOVERNMENT TO THE PATENTS OF NAVAL OFFICERS.

A bill has been introduced in the Senate and referred to the Committee on Naval Affairs, providing for the use by the United States of devices invented by its naval officers while engaged in its service, and covered by letters patent. In common with section 7 of the amendments to the patent statute, to which we referred in our last issue, the present bill is the outcome of an inquiry made by the Committee on Naval Affairs into the question of the prices of armor plate supplied for vessels of the navy. In its present form it shows several important modifications of the original draft, and Senator Chandler is to be congratulated on having proposed in this bill a just and conservative solution of a difficult question. The provisions of the bill are as follows: "Whenever, in the judgment of the Secretary of the Navy, the public interests require the use in the naval service of any invention or discovery covered by letters patent issued to any officer of the navy, whether retained in his ownership or assigned to others, said secretary shall proceed to use said invention or discovery in the manner and to the extent required by such naval service, and such royalties and compensation as may be equitably due such officer, considering all the circumstances connected with the making of the invention or discovery, and especially all facilities in originating, working out, or perfecting the invention which the officer may have enjoyed by reason of his official position, may be recovered by suit brought by said officer in the Court of Claims. Said court shall make rules for the trial of such cases, conforming as far as may be with the rules established by the Supreme court for the practice in courts of equity, and all cases shall be determined within one year from the filing of the petition therein, unless, in the discretion of the court, upon sufficient cause shown, the time is extended. The Secretary of the Navy is hereby prohibited from making any contract or payment for the use of any patent taken out by any naval officer."

The inquiry by the Naval Affairs Committee was too lengthy to allow of our making any detailed reference to it at present. It turned chiefly upon the history of the Harvey and other patents for the manufacture of armor plate; the relations of certain naval officers to these patents and their use by the navy; and the question of certain contracts for armor which had been made by the Secretary of the Navy without previous advertisement and competition. The record of

the inquiry and the concluding recommendations of the committee seem to carry a color of unfriendliness to the patentee, at least so far as he may "become a burden upon the government." If such unfriendliness was shown, it was because of a misapprehension of the true relation of the government to the patent system, and of the intrinsic value of the patent to the government, considered as a user. For it is certain that the government will never adopt a patented invention unless it is of the opinion that, all things considered, it will be a gainer thereby. The fact that it is willing to pay a royalty is surely sufficient proof that the patent is not in any sense a burden, and it is certain that the payment of royalties can no more justly be termed a "burden upon the government" than the fulfillment of any other financial obligations for which a valuable equivalent is given.

In the case of the Harvey patents, which figured so prominently in the investigation, it transpired that Mr. Harvey's first patent, taken out in 1888, was for making a steel suitable for tools; that, at the suggestion of Commander Folger, he applied his hardening device to the manufacture of armor plate; that the consideration of his application was expedited at the request of the Secretary of the Navy; that, as the result of contracts made with the Harvey Steel Company, it received \$96,056 as a royalty on armor plates used up to July 19, 1892, and a royalty of half a cent a pound on any additional plates that might be used. Such, in brief, is the history of the government's connection with the Harvey patents. To an impartial reader it can simply suggest that the Navy Department was desirous of using a valuable device, and that it paid only a reasonable amount for the privilege. No doubt \$96,056 is a large sum of money, considered by itself; but it sinks into insignificance in comparison with the enormous benefits which accrued to our navy when it adopted Harveyized armor for its ships. Face-hardened armor gave to our battle ships an efficiency which was unapproached by any navy of the world, and raised our prestige to as high a position as it held during the naval operations of the civil war.

The question of the use by the government of devices invented by its naval officers is complicated by the fact that such officers enjoy special facilities for experimental work, and that the invention of a naval officer may be due as much to the extraordinary opportunities afforded by his official position as to his own individual ability. In this respect he has a material advantage over the civilian inventor, and it is only natural and just that the government should be in a position to determine the amount of royalties and compensation which are due such an officer.

As we have already said, the present bill is admirably adapted to cover the case. It is relieved of a certain fatal clause which was carried by the previous bill introduced by Senator Chandler during the last Congress. This clause declared that "hereafter no patent shall be issued to any naval officer without the written approval of the Secretary of the Navy"—a restriction which, for obvious fundamental reasons, would have effectually barred the passage of the bill. The provision for the recovery of all claims for compensation in the Court of Claims, the rules of trial being made in conformity with the rules of practice in courts of equity, will commend itself as being the most satisfactory and constitutional method of dealing with such cases. It safeguards the interests of the government without interfering with the rights of naval officers under the patent laws.

Another commendable feature of the bill is the clause which requires that all cases shall be determined within one year from the filing of the petition therein. This enables the government to make immediate use of a valuable invention—as it might wish to do in time of war—and at the same time secures an early settlement of the claims of the inventor for compensation.

AMENDMENTS TO THE COPYRIGHT LAW.

To meet cases of wrongful marking of chromos and other imported publications, an amendment to the copyright law was passed at the last session of Congress and became law March 3. It had become the practice with some foreign publishers to mark articles as "copyrighted," thus giving the impression that the articles had been copyrighted in the United States when such was not the case, and this was often done with matter not properly subject to copyright, as mere advertisements, circulars, ruled sheets, etc. It was difficult under the old law to reach the domestic dealer in such wrongly marked publications.

It will be remembered that the former copyright law imposed a penalty of one hundred dollars for marking as copyrighted articles for which a copyright had not been obtained. The new law, which is an amendment to section 4,963 of the copyright laws of 1891, makes the penalty of one hundred dollars further apply to the marking as copyrighted of articles not subject to copyright, and to the issuing, selling or importing of books, chromos, photographs, etc., bearing a copyright notice, but not copyrighted in the United States. Further than this, such importations of articles bearing notice of copyright, but not actually copyrighted here, are prohibited, and the courts are authorized to enjoin the

issuing, publishing or selling of such articles at the suit of any one complaining.

Another amendment to the copyright law pertains to section 4,966, and was enacted January 6, 1897. It prohibits the unauthorized public performing of copyrighted musical or dramatic compositions, under penalty of not less than one hundred dollars for the first and fifty dollars for each subsequent offense, or such performance may be judged a misdemeanor if it be willful and for profit. An injunction granted by any circuit court in restraint of such performance is also made operative in any other circuit in the United States. This law was enacted to protect playwrights and theatrical managers, and prevent traveling companies from pirating their plays. Heretofore these companies could evade process by traveling from one judicial district to another, and the financial irresponsibility of many of them made a judgment against them of little or no value. It is said, however, that the law goes further than was intended in respect to musical compositions, as composers and publishers generally like to have their music played, in order that a demand may thus be created and more copies of their music sold.

GEMS OF QUARTZ ORIGIN.

Mr. George F. Kunz, in the New York Sun, writes the following: Rock crystal is the purest form of quartz, transparent, colorless, and exhibits most perfectly the properties of the mineral. It is widely distributed, but is brought chiefly from Brazil, Madagascar, Japan, and North Carolina. It is wrought, especially by the Japanese, into polished crystal balls and other articles of elegant ornament. The Romans made much use of it to incise their intaglios, and it has been worked into vases and caskets from the time of Nero to the present, but especially during the fifteenth and sixteenth centuries. Remarkable crystal objects are to be seen in the Louvre, the Green Vaults of Dresden, the Schatzkammer at Vienna, and at Madrid.

Spheres of rock crystal were used as show stones and for divination from the thirteenth to the eighteenth centuries. The engraving and cutting of some of these was so elaborate as to cost years of work and thousands of dollars. Spheres have been cut up to eight inches in diameter, and valued at from \$1,000 to \$20,000. Nearly the latter price was paid by the late Gov. Ames for the magnificent crystal ball bequeathed to the Boston Fine Arts Museum. This ball measures 185 mm., or 7 1/4 inches. It was found in 1876. The crystal from which it was cut was 18 inches high, 14 1/2 inches wide, and 12 inches thick. It was found on the Ortake-muko-Yuma, province of Kohi, Japan, originally the property of Naito Arimori, and purchased from Naito Tuskuba for 18,000 yen—about \$18,000. It was cut by an old workman, who had devoted his entire life to cutting rock crystal balls. This one was started in June, 1891, and finished in December, 1894. The ball weighs nineteen pounds. The famous Dresden ball measures 6 3/4 inches and weighs 16 1/2 pounds, but is quite imperfect. A five inch ball cut from material found in Ashe County, North Carolina, and another nearly six inches in diameter, from the summit of Mount Antero, Colorado, are now in the Field Columbian Museum in Chicago. Though not entirely perfect, they are quite equal to the balls of the eighteenth century.

At Hot Springs, Ark., clear, rolled pebbles found on the banks of the Ouachita are often sold. These are more highly prized than the quartz crystals, as the fancy prevails that they cut clearer gems. The scarcity of these, and the demand for them, has led to their artificial production, by putting the crystals into a box which is kept revolving for a few days by water power. Any expert, however, can discern the difference, since the artificial ones have a little whiter surface.

Many places in Colorado furnish fine specimens, and along the New Jersey coast and Long Branch, Atlantic City, Cape May, and other places, transparent pebbles are found in the sand and are sought after by the visitors, who often have them cut as souvenirs. At such places the local lapidaries have been known to substitute for pebbles from the beach foreign-cut quartz, cairngorm, topaz, crociolite, Ceylon moonstone, and even glass, obtaining twice the value of the foreign gem for the supposed cutting. Sometimes even the stones found by the visitors are exchanged for cut ones from Bohemia, Oldenburg, and the Jura. Cutting is done abroad on so large a scale and by labor so poorly paid that the cut stones can be delivered in this country at one-tenth of the price of cutting here, because the rock crystal itself has but little value.

Amethyst is a transparent purple variety of quartz, its color being due to oxide of manganese. It is a very beautiful stone, much used by the ancients to engrave on, but certain varieties are now but little valued, because not rare enough to be costly. It is found in Brazil, Ceylon, India, and the Ural Mountains. In the latter region, near Mursinka, are found superb deep purple gems, changing to red by artificial light, some of which have sold for \$500 each. For intensity and perfection of color, and, one might say, majestic beauty, these rival almost any other gem. Smaller but equally fine amethysts occur in Delaware County,

Pennsylvania, Maine, and North Carolina. Oriental amethyst is a purple variety of sapphire, far more rare and valuable than the ordinary amethyst.

Agates are usually formed by the deposit of silica, with more or less of coloring oxides, in the cavities of igneous rocks. When the rock disintegrates, they fall out as hard nodules, and are then found on the surface, or frequently strewn along shores, beaches, and the beds of streams. These agate pebbles are abundant on the shore of Lake Superior and on the beach at Pescadero, Cal., and are gathered as souvenirs and to some extent cut for local jewelry. Externally they are rough and of little beauty, their veined structure and colors only appearing on breaking them, and still more upon polishing. They are made into seals, rings, pencils, handles for swords, knives and forks, mortars for grinding chemicals, bearings for fine balances, beads, studs, earrings, trinkets, match boxes, and many other objects.

A peculiar feature of all these agates and chalcedonies is their power of absorbing coloring matters under certain conditions, and by this means all manner of highly colored varieties are artificially produced by skillful treatment of the stone. Most of the deep red carnelians and sards are thus prepared by burning from pale or dull colored chalcedony, and all the black agate, which has now quite replaced jet in mourning jewelry, is so prepared. In the banded varieties some of the bands are more absorbent than others, and thus the highly colored black and white onyx and red and white sardonyx are produced, and most of the richly tinted variegated agates used for ornamental work. Picture agates is the name given to quaint markings resembling human forms or like objects. The famous Madonna agate in the Vienna collection has thousands of peasant visitors annually.

Moss agate has been much less used during the past twenty years than formerly, the annual sales not exceeding \$1,000. Since the recent use in cheap jewelry of the Chinese natural green and artificially colored red and yellow moss agate the sale of the American has greatly fallen off. At Hartville, Wyo., large masses of moss agate weighing from forty to fifty pounds each were recently found in limestone rock. When cut into translucent slabs they show the magnificent black dendritic or mosslike markings in a most striking manner. Some table tops of this elegant material were exhibited in the Wyoming section of the Mining building at the World's Columbian Exposition. The finest instructive collection of agate known is the wonderful series presented to the Harvard Mineralogical cabinet by Dr. W. S. Bigelow, of Boston. Ruskin wrote upon and presented a fine series of agates to the British Museum.

If chalcedony is boiled in a solution of molasses and water, blood and water, or sugar and water, until it has absorbed a quantity of the solution, and is then again boiled in sulphuric acid, the transparent hydrocarbon is changed to a charcoal-like substance, and black onyx is produced. When white bands alternate with the chalcedony they are impenetrable to the coloring, and appear clearer and brighter. Black onyx has now almost entirely superseded jet.

The yellow variety is made by first putting the stones in a honey solution, then in a solution of chromate of lead for several days. Placed for a few weeks in hydrochloric acid, kept at a moderate heat, a beautiful clear yellow color is given to the streaks that were before a dirty brown. This is also erroneously called golden opal. Stones of a reddish hue are greatly improved in brilliancy of color by first thoroughly drying them for weeks in ovens, then dipping them in sulphuric acid, heating to full red heat, and afterward slowly cooling them. The changes that take place in both these processes are upon the oxide of iron which is the coloring matter.

Modern chemistry has wrought great changes in agate coloring, as in other arts, a secret process having been discovered by which chalcedony of any single color can be made to assume any two or more colors, so that an onyx of any shape or variety of colors can be made. If a sunken center of another color is required, it can be made so that the figure, when cut out, remains in a hollow, forming a cameo intaglio. In this manner the fine cutting of the cameo is protected. A white figure may be made in a black stone, a red figure in a brown stone, or a white one in a red stone. By this process the entire stone is first changed to the color desired for the outer layer, then a cavity is cut in the top and a solution put into it, which alters it to the required color. It is this discovery that has made a formerly valuable onyx worth now only a nominal sum.

Agates are thus made to assume the onyx character, which is desired by the lapidary for the production of cameos and intaglios in imitation of the antique sculptured gems. In cameos the figures are in relief and of a different color from the ground. Intaglios are usually all of one color. In Persia inscriptions or devices are written on beads of carnelian and other forms of agate with carbonate of soda and other chemicals; they are then burnt, and the inscription appears white in contrast to the other color. The

principal supply of agates for the last hundred years has come from Brazil and other South American countries, where the stone is mostly found by Germans, who leave Oldenburg for that purpose, and who persevere until they find it. Thence it is sent to Germany for cutting, chiefly to Oberstein and Idar. Every fortnight from five to ten tons of the rough material is sold in Idar at public auction, usually in assorted lots of 100 or 200 pounds. The industry yields to the district an annual net profit of half a million dollars, and good agate workmen are among the best paid laborers in Germany, earning from \$1.50 to \$2 per day.

A NEW DISCOVERY IN PHYSICS.

It has been announced, says the Electrical World, that Dr. P. Zeeman, of the Amsterdam University, while working at Leyden, discovered that the lines of a metallic spectrum are broadened when the source of light is in an intense magnetic field. The experiments of Dr. Zeeman were most rigorously and accurately conducted. Both emission and absorption spectra were examined with a large Rowland grating spectroscope, and the results were marked and certain. The meaning of the fact is clear to those versed in electro-optics, and, indeed, some such broadening had been predicted by several physicists and sought for by others. Dr. Lorentz, of Leyden, from theoretical considerations, ventured the prediction that the light at the edges of the broadened lines would be found to be polarized. This was completely verified by the experiments of Dr. Zeeman. The discovery will probably substantiate the hypothesis that radiation is due to the motion of electric charges, whether free or associated with the vibrating molecules of the luminous body. It has seemed more and more likely, as knowledge of ether physics has advanced, that radiation could not be excited by the motions of the inert molecules of matter, but must of necessity require their electrification. The new facts apparently demonstrate that this is true, and throw another ray of light upon the still obscure subject of the mechanism of radiation. Of course, the principle bearing of the discovery is upon the theory of light. It is a step toward more complete knowledge of the means by which the particles of a body at high temperature disturb the adjacent ether. It contains also the germs of conclusions regarding the nature of radiating and absorbing matter which may go far toward extending our knowledge of molecular and ether physics. There is little doubt that the solutions of the two mysteries—the nature of light and of electricity—are destined to be simultaneously attained. This discovery is probably the most important contribution to science since Roentgen's announcement of his new form of radiation. The fascinating field of speculation opened by each advance toward knowledge of the ultimate nature of electricity and radiation and the mechanism of the ether contains most alluring possibilities of discovery, and every step taken in such an advance is of the utmost importance to nearly every branch of science.

USEFULNESS OF THE SIMPLON TUNNEL.

The Popolo Romano has published, says The Engineer, in one of its interesting special articles on the leading interests of Italy, a summary of the advantages to be derived from the projected tunnel through the Simplon, both to Italy and to travelers to and from Italy and Europe at large. The following table shows the respective distances in kilometers from different parts of Italy to all Western Europe and England:

	Mont Cenis.	St. Gothard.	Simplon.
Milan to Paris.....	945	904	854
Milan to Boulogne.....	1239	1128	1108
Milan to Calais.....	1258	1105	1150
Piacenza to Paris.....	986	973	923
Piacenza to Boulogne.....	1269	1188	1155
Piacenza to Calais.....	1310	1185	1198
Venice to Paris.....	1208	1156	1103
Genoa to Paris.....	964	1047	946
Genoa to Calais.....	1261	1222	1243

But besides the shortening of distances, there is an advantage in the reduction of the height to be climbed, which is by the Mont Cenis route 1293 meters, by the St. Gothard 1155, and by the Simplon only 705. The heaviest gradient on the Simplon is—and that only for 19 kilometers—22 per 1000, while the heaviest on the St. Gothard reaches 26 and on the Mont Cenis 30. When the Neuchatel-Pontarlier line is shortened the real gain in the run from Milan to Paris will be 124 kilometers. There will be a gain also for Italy in the shortening of the distances from Genoa to the great industrial centers of Western Switzerland. The advantages for tourists coming from the West who desire to reach the north of Italy are considerable, to say nothing of the pleasure of a new route which passes through a section of the high Alps not hitherto touched by railway. According to the Times, the shortening of the distance will make the trip cheaper and compel the other lines to reduce their fares.

To our way of thinking, says the Messenger, published at Hallstead, Pa., the SCIENTIFIC AMERICAN is the most instructive, interesting, and progressive publication of its class in the world.