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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 248.

For the Week ending October 2, 1880.

Price 10 cents. For sale by all newsdealers.

Table listing sections I through VI, including Engineering and Mechanics, Technology and Chemistry, Geology, etc., with detailed sub-entries and page numbers.

POTTERS' MACHINERY—AN OPENING FOR INVENTORS.

Why it is that potters are not inventors, and that the means, methods, and appliances of potters have failed to challenge the ingenuity of men not engaged in that industry, it is hard to say. The fact is manifest, however, that there is no other industry which has been so little benefited by invention during the past two hundred years.

The meaning of this provision is not so clear as it might be. Still it is evident that the United States Potters' Association require an absolute surrender by the inventor of any property rights in his invention before the offered prize is awarded.

Speaking of the premiums offered, the Pottery and Glassware Reporter remarks that "whatever causes may be to blame for it, it is an established fact that pottery is behind the age in the matter of labor-saving machinery, the same hand processes being now employed as were in vogue thousands of years ago.

Though the anti-patent stipulation is likely to prevent any eager competition for the prizes referred to, the offer of them may be beneficial in calling the attention of inventors to the field so long left fallow.

The associated potters appointed Messrs. Thomas C. Smith, Greenpoint, N. Y., John Moses, Trenton, N. J., and M. Tempest, Cincinnati, Ohio, a committee to investigate and test any inventions that may be offered, and to award the prizes.

BURNING OF A SUPPOSED FIREPROOF BUILDING.

In the recent burning of the Manhattan Market, one of the most conspicuous and costly buildings in New York, we have another illustration of the fatal mistake of putting into a would-be fireproof building just enough wood to cause its destruction.

In this case the blunder was not so apparent as the common one of setting a wooden spire over a stone church, or a tinder box, in the shape of a mansard roof, over a granite warehouse; yet the blunder was there, and the ruin of a building which cost \$1,400,000 is the result.

The building was considered practically if not absolutely fireproof. The floor was of concrete, the walls were of brick and glass, the rafters were iron trusses, and the roof was covered with slate.

The building was erected in 1871, and occupied the block bounded by Thirty-fourth and Thirty-fifth streets, and Eleventh and Twelfth avenues. It was 800 feet long, 300

feet deep, 80 feet high in the interior, and was surmounted by a lofty clock tower. The building, with the land and foundations, cost about \$2,000,000. The loss by the fire exceeded \$900,000.

CONSCIENTIOUS WORKERS.

The tendency of our times is to disregard old maxims. It is true, many of them, based on the experience of other people under very different conditions, are not applicable in our day. "Haste makes waste" may be true in the workshop, but the business man knows that "time is money," and it pays to be in a hurry when the market shows signs of a change.

The good old maxim that "whatever is worth doing is worth doing well," is too often forgotten. "That is good enough for him, or for the money," is a poor excuse for a man to sacrifice his good name, and still worse to induce him to acquire careless habits.

There are many people in every land who like to be humbugged, while others have an equally strong passion for cheap wares, whether poor or good, and some one must supply this demand. The producers of such goods employ poor workmen at correspondingly poor wages, because they must make their profits out of their workmen.

It never pays to be a poor workman. If you are a young man, aim to do honest work, and, although your present employer may not be willing to pay you any more for a well-made coat or a neatly-finished boot than he would for a batch, don't be discouraged.

Every manufacturer knows the value of a good reputation. There are names that will sell almost anything. Why do Burt's shoes bring a better price than those of other makers?

The path to fame by honest merit is a slow and tedious one. A manufacturer who is so careful about his products that he has to put a higher price on them than his less conscientious neighbor can sell for, may be repaid at first by small sales and smaller profits.

It is much the same with the workman as with the manufacturer. If every stroke he strikes is solid work, conscientiously performed, he will acquire a reputation, limited as it may be, that is sure to pay in the end.

The native American is distinguished by his ingenuity, and with half a chance he makes his mark everywhere. Yet he sometimes loses the race in competition with less able men of other lands, because their careful training and early drill in their profession, their long and severe apprenticeship, has more than compensated for the want of natural tact and ingenuity.

Perseverance will not conquer all things, but it goes a long way toward success. While luck seems to favor the

few, most men have to carve out their own success by hard labor, in which a full determination to do everything to the very best of one's ability counts for more than is generally supposed. Above all things, don't waste time in regretting that another trade was not chosen. If it is an honest one, stick to it and it will pay.

THE PHOTOPHONE.

As the remarkable series of investigations in relation to sound transmission by light, which led to the invention of the photophone by Professor Bell, have already been described at length in the SCIENTIFIC AMERICAN (page 176, current volume), and in the SUPPLEMENT (No. 246), only a brief reference to the fundamental principles of the invention will be needed to make clear the annexed diagram, which illustrates the manner in which articulate speech is transmitted by means of a beam of light, without any visible or tangible connection between the transmitting and receiving stations.

A beam of light from any source is concentrated on the diaphragm, A, by the lens, B, and the diaphragm, which is capable of reflecting the light, is placed in such a position in relation to the lens, B, as to project the light along a line joining the axes of the lens, C, and the parabolic reflector, D. The lens, C, renders the divergent rays of light parallel, and the parabolic reflector concentrates the light upon the selenium cell, E.

The selenium forms a part of an electrical circuit, which includes the battery, F, and receiving telephone, G. A sound made in the vicinity of the transmitting instrument vibrates the diaphragm, A, and undulates the beam of light projected through the lens, C, and the consequent variations in the intensity of the light concentrated on the selenium by the parabolic reflector changes the electrical conductivity of the selenium and renders the electric current undulatory. This current affects the receiving telephone in the same way as it would be affected in an ordinary telephonic circuit, and the sounds made in the transmitting instrument are reproduced in the telephone.

We have described but a single form of apparatus, as the principle is substantially the same in all the forms made known to the public. Professor Bell, in his recent lecture before the American Society for the Advancement of Science, said that about fifty different forms of apparatus had been devised. The distance through which the "photophone" will work successfully has not yet been determined, but it is believed that the extreme will be limited only by the difficulty of adjusting the instruments at widely separated stations.

In the course of his experiments with a perforated disk interrupter, Professor Bell sought to ascertain the nature of the rays that affect selenium. For this purpose he placed in the path of an intermittent beam various absorbing substances. When a solution of alum, or bisulphide of carbon, is employed, the loudness of the sound produced by the intermittent beam is very slightly diminished; but a solution of iodine in bisulphide of carbon cuts off most, but not all, of the audible effect. Even an apparently opaque sheet of hard rubber does not entirely do this. When the sheet of hard rubber was held near the disk interrupter, the rotation of the disk interrupted what was then an invisible beam, which passed over a space of about twelve feet before it reached the lens which finally concentrated it upon the selenium cell. A faint but perfectly perceptible musical tone was heard from the telephone connected with the selenium. This could be interrupted at will by placing the hand in the path of the invisible beam. It would be premature, says Professor Bell, without further experiments, to speculate too much concerning the nature of these invisible rays; but it is difficult to believe that they can be bent rays, as the effect is produced through two sheets of hard rubber containing between them a saturated solution of alum. Although effects are produced as above shown by forms of radiant energy which are invisible, the apparatus for the production and reproduction of sound in this way has been named the "photophone," because an ordinary beam of light contains the rays which are operative.

Arrival Home of the Anthracite.

The little steamer Anthracite, worked on the Perkins high pressure system, arrived at Falmouth, England, on the 14th of September, having made the voyage from Philadelphia in twenty-three days. She had on board at starting twenty-five tons of coal. Having thus twice crossed the Atlantic successfully, this vessel seems to have well demonstrated the practical value of the new system. The reports of the machinery trials of this steamer, which took place a few weeks ago at the United States Navy Yard, Brooklyn, have not yet been made public.

Phosphorescent Lighting.

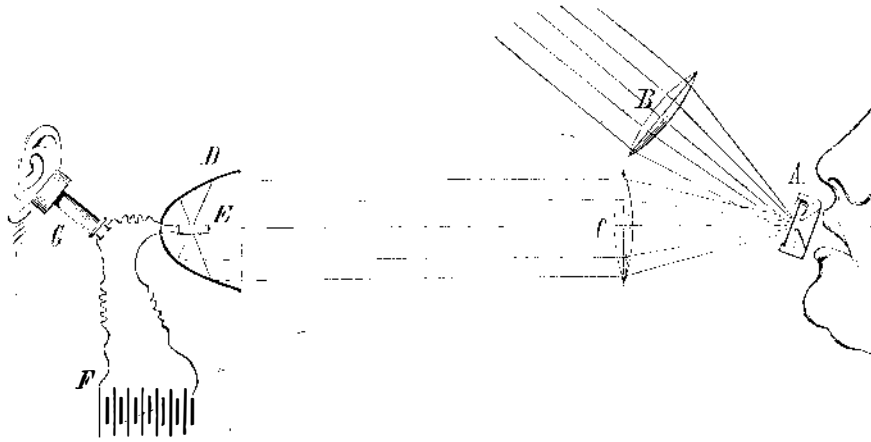
Dr. Phipson takes sulphide of barium, or some other substance which is rendered phosphorescent by the solar rays, and incloses it in a Geissler tube, through which he passes a constant electric current of a feeble but regular intensity. He claims to obtain in this manner a uniform and agreeable light, at a cost lower than that of gas.—*Les Mondes.*

THE SOCIAL SCIENCE ASSOCIATION.

The annual meeting of the American Social Science Association began in Saratoga, N. Y., Sept. 5. The papers read related chiefly to education and sanitary affairs. The report of the Committee on Casualties in Mining, read by Mr. J. D. Weeks, of Pittsburg, showed that "in Pennsylvania, one man was killed last year for each 105,700 tons of anthracite raised, a greater mortality than obtained in English mines. In Ohio the figures, confessedly imperfect, give one death to 142,253 tons of coal raised in 1874, and in 1878, one death to 255,000 tons raised. While some accidents are unavoidable, there is no doubt that a great majority of explosions come from the carelessness of miners, who will not hesitate to open a safety-lamp surrounded by fire damp to

clothing if naked; second, a long, steady, patient pull by a wise, strong hand up into solid land. This is the work in which the associated charities ask cordial co-operation. Almsgiving, which saps manhood, self-respect, and self-reliance, is a curse. "The Care and Saving of Neglected Children" was considered by Miss Hollowell, and the "Volunteer System of Charity," by Mrs. F. B. Lockwood. Mr. G. B. Bartlett submitted a paper on "The Recreations of the People," in which he attributed most of the recent improvement in the physical health and strength of our people to the increase in holidays and the attention given to athletic sports. Mrs. Julia Ward Howe contributed a paper on "The Changes in American Society," and Frederick Law Olmstead one on "Public Parks," in which he called

attention to the fact that twenty-five years ago we had no parks which might not better have been called something else than a park, whether so designated or not. Since then a class of works so-called has been undertaken which to begin with are at least spacious and have possibilities of parklike qualities. On twenty of these now in progress over \$40,000,000 have been expended—well nigh \$50,000,000—and this does not tell the whole cost. Considering that in the towns making this outlay the necessity of a park was little felt, it manifests a remarkable progress of public demand. While in the first half of the century only one public park was laid out in Europe, since 1850 as many parks have been laid out in the large towns of Europe as with us, and the area has been larger there. What has been secured for London alone is of greater extent than all the town parks



BELL'S PHOTOPHONE.

light a pipe. The peril from the falling of roofing and slate is greater, however, than any other, being about 40 per cent. of the total; and of these the public hears the least because they are so common. These are too often the result of forgetfulness, rashness, or neglect. And again, employes are more at fault than employers. In fact, carelessness and neglect are common among miners to a degree which seems scarcely possible.

A report on Kindergarten schools by W. T. Harris, of St. Louis, recognized very clearly the advantages of positive, playful, and social training for children, and as clearly the defects and dangers of the Kindergarten system as developed by Froebel and carried out in this country. The characteristic differences between American and German children, from geographical and social causes, were well insisted upon, but no reference was made to the narrow range and purely artificial cast of Froebel's mind as exemplified in the matter and method of his teaching. His spirit was true and admirable, but his system rigidly applied is anything but suitable for American children.

Education in England, particularly as developed for girls and women, was treated by Miss E. J. Simcox, of the London School Board, and the co-education of the sexes was afterward discussed with some feeling. Another aspect of education was considered by President J. M. Gregory, of the Illinois State University, in a paper on American newspapers. Mr. Gregory took a generous and hopeful view of the influence of newspapers, regarding them as the best index of American life and the fairest representation of the people. The best brain of the country speaks through the newspapers. They are the people's libraries—the cyclopaedia of the millions.

The sanitary renovation and salvation of Memphis was discussed by Dr. A. F. Lincoln, of the National Board of Health. The regulation of medical practice by statute law was considered by Dr. E. W. Cushing, of Boston; and the economic aspects of the treatment of the insane, by Dr. Walter Channing, of the same city.

The question of adulteration of foods, medicines, etc., was brought prominently before the meeting by Mr. George T. Angell, whose sweeping assertions were disputed by Professor S. W. Johnson, of New Haven, Professor Remsen, of Baltimore, Professor Nichols, of Boston, and others. Secretary Sanborn, on the contrary, stood up for Mr. Angell, rating the negative testimony of those who had not been able to discover many or frequent adulterations as of less weight than that of men who had found such adulterations.

The proceedings of the second day's meeting embraced the reading of the following papers: "The Socialist Laws of Germany," by H. W. Farnham; "Modern Legislation Touching Marital Rights," by Henry Hitchcock; "Libel and its Legal Remedy," by E. L. Godkin; "Pensions in a Republic," by F. J. Kingsbury; "Laws Regarding Dissection and Grave Robbery," by Edward M. Hartwell; and "Indeterminate Sentences for Crime," by Z. R. Brockway, Superintendent of the Elmira Reformatory.

In the first paper and the third and last day, Rev. D. O. Kellogg read a paper on "The Principle and Advantage of Association in Charities." In the subsequent discussion Robert T. Paine maintained that charity must do four things—relieve worthy need promptly, fittingly, and tenderly; prevent unwise alms to the unworthy; raise into independence every needy person, where this is possible, and make sure that no children grow up to be paupers. Relief, detection, elevation, and prevention are all essential parts of a complete plan. Families or persons who have fallen into want usually need, first, relief—food if hungry, fuel if cold,

of America together. The next meeting of the Association will be held in Saratoga in September, 1881. The officers for the year are:

- President—Francis Wayland, Yale College.
- Vice Presidents—Benjamin Pierce, Cambridge, Mass.; Theodore D. Wolsey, New Haven; Martin B. Anderson, Rochester; Mrs. Caroline H. Dall, District of Columbia; Thomas C. Amory, Boston; Henry B. Baker, Lansing, Mich.; Thomas M. Post, St. Louis; J. W. Hoyt, Cheyenne; Rufus King, Cincinnati; W. H. Ruffner, Richmond; W. L. Trenholm, Charleston; Isaac Sherman, New York; Henry Villard, New York; Maria Mitchell, Poughkeepsie; Nathan Allen, Lowell; Mrs. J. E. Lodge, Boston.
- General Secretary—F. B. Sanborn, Concord.
- Treasurer—F. J. Kingsbury, Watertown, Conn.
- Directors—Dorman B. Eaton, New York; T. W. Higginson, Cambridge; Horace White, New York; J. W. Dickinson, Newton, Mass.; Anson P. Stokes, New York; Jonas M. Libby, New York; Carroll D. Wright, Boston; G. J. Riche, Philadelphia.
- Department of Education—W. T. Harris, Concord, Mass., chairman; Emily Tarbott, Boston, secretary.
- Health Department—D. F. Lincoln, Boston, chairman; E. W. Cushing, Boston, secretary.
- Finance Department—David A. Wells, Connecticut, chairman; Hamilton A. Hill, Boston, secretary.
- Department of Social Economy—W. B. Rogers, Boston, chairman; Walter Channing, Boston, secretary.
- Department of Jurisprudence—Francis Wayland, New Haven, chairman; Theodore J. Woolsey, New Haven, secretary; corresponding members, Moncure D. Conway and Edith Simcox, England.

The Course of a Lightning Flash.

Prof. Tait, of Edinburgh, insists that when people think they see a lightning flash go upward or downward they must be mistaken. The duration of a lightning flash is less than the millionth part of a second, and the eye cannot possibly follow movements of such extraordinary rapidity. The origin of the mistake seems, he says, to be a subjective one, viz., that the central parts of the retina are more sensitive, by practice, than the rest, and therefore that the portion of the flash which is seen directly affects the brain sooner than the rest. Hence a spectator looking toward either end of a flash very naturally fancies that end to be its starting point.

Shades for Electric Lights.

A French inventor, M. Clémandot, has devised a shade for reducing the glare of electric lights, which he claims to be much more economical than ground glass globes. He makes his lantern of glass tubes filled with finely spun glass threads or glass wool. By reflection from the glass threads the light is given the desired diffusion, with a loss of illuminating power not exceeding 15 per cent, against 30 or 40 per cent with opal or ground glass. The natural blueness of the electric light can be corrected by tinting the glass tubes or the inclosed wool.

Loss of Melbourne Exhibits.

By the wreck of the ship Eric the Red, on the southwest coast of Australia, 150 cases of goods for the American exhibit at the Melbourne World's Fair were lost. As the Exhibition opens October 1, the exhibits cannot be replaced.

THE locomotive of the train that was wrecked in the Tay Bridge disaster has been fished up and repaired, and is now drawing trains on the Edinburgh and Glasgow line.