

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

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VOL. XXXIX, No. 18. [NEW SERIES.] Thirty-third Year.

NEW YORK, SATURDAY, NOVEMBER 2, 1878.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as Amalgamator, Forster-Firmin, Antimony for batteries, Astronomical notes, Baking powder, Barometer, mercurial, Bees, immense labor performed, Blue, Prussian, Botanical Club, Torrey, Chromos, tea, improvement, Civilization, modern, state of, Cloth, to make waterproof, Colic, lead, milk cure for, Compass, mariner's, Correction, a, Corundum, Electric light and Gas Co.'s, Electrodes, polarization of, Emery, to separate, Exhibitors, American, at Paris, Exhibition, Paris, Fragarine, Gas, fuel, Glue to fasten on iron, Gold, intrinsic value of, Goods, American made, Gum, Balata, Gun, a nail, Hair, superfluous, to remove, Hop picking by machinery, Horse, fire, Bruce, crude, Ice, artificial, to make, Improvements, Australian, Ingenuity, displays of, Inventions, new agricultural, Inventions, new mechanical, Inventions, recent, Iron, new ways to use, wanted, Juice, milkweed, King, Tody, Life, without air, Lubricene and cups, Chart's, Machinery, agric., Am. export of, Manufactures, to engage in, Nickel plating liquid, Nitrite of amyl in sea sickness, Numeration, system of, Oak, golden cup, the, Patent law, Patent rights, benefits of, Patents, incoming commissioner, Phonograph, Plant stalks, stiffening of, Polson, cadaver, Polish for cleaning cylinders, Poplar, as a lightning cond., Potassium iodide, dangers of, Progress in England and Amer., Quartz, formation of, Socks, confection of, Rubber, to fasten on brass, Serpulas, or sea worms, Sewing machine, new Wilson's, Shooting, rifle, future, Snails in medicine, use of, Solution, silver plating, Sugar, beet root, Sulphur, crude, Tea fields, California, Trees, big of California, Trigonometer, Lyman's, Walnut stain, recipe for, Water, delicate test for, White lead for painting

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 148.

For the Week ending November 2, 1878.

Price 10 cents. For sale by all newsdealers.

I. ENGINEERING AND MECHANICS.—Railway Statistics of the World. Accidents from Machinery.—The Distribution of Labor. Recent Trials of Projects and Arrows. Instructive trial of shells against heavy armor. Steel projectiles with wrought iron caps. 5 illustrations.—Lancaster's Continuous Kiln. 1 figure.—Dueberg's Brick Kilns. 1 illustration.—The New Eddystone Lighthouse.
II. ARCHITECTURE AND BUILDING.—Masonry and Brickwork. By J. CLARK JEFFERSON, A. R. S. M. Properties required for good Bricks. The various binding materials. Mortar, with the properties and proportions of lime and sand. Analyses of mortar from 50 to 600 years old. A valuable paper.—The Temple of Jerusalem, as restored by Herod the Great. One page illustration.
III. FRENCH INTERNATIONAL EXPOSITION OF 1878.—The Italian Section, with 1 large illustration.—The Ponsard Regenerating Furnace, with 3 figures. Medium Mill Furnaces at the Point l'Eveque Forges. Fusion of Spiegelisen. Bessemer Works at Terrenoire and Besseges. Manufacture of Bottle Glass.—Locomotive Engines. Paris and Orleans Railway. Dimensions, speed, tractive power, etc.; with 1 figure.
IV. TECHNOLOGY.—Ivory and its Modern Uses.—To Prevent the Shrinkage of Wool.—Coloring Wood by Pressure.—Purity of American Beer.—Brewing in Russia.—The dangerous indulgence in raw spirits in Russia.—The extensive introduction of cheap malt liquors, and what the government has done to encourage brewing. Hop Culture in Russia, and proposed improvements by the government.—Burr Stones from Oregon.
V. ELECTRICITY, LIGHT, HEAT, ETC.—Sound and the telephone. By CLARENCE J. BLAKE. A paper read before the British Society of Telegraph Engineers. The human ear. Perception of high and low tones. Acoustical experiments with the ear apparatus. Telephonic experiments. Delicacy of the Telephone Disk Movement.—The Thermophone. By T. WISEMANN. 2 figures.—Conduction of Heat in Dry and Moist Soils.
VI. NATURAL HISTORY, BIOLOGY, ETC.—Man and his Structural Affinities. From a lecture delivered before the Buffalo Society of Natural Sciences. By A. R. GROTE. Remarkable similarity of the bony structure of various animals. The gorilla, with portrait. The gorilla compared with man. Relative size of cranium. The chimpanzee, the orang-outang, and several apes and monkeys, with 22 figures of hands and feet. Characteristics of the apes and monkeys. Strange human resemblances. Our relation to the anthropoid apes. Comparative brain development, with 6 figures of heads.
Twenty Years' Progress in Anthropology. From Professor Huxley's Address before the British Association. What was a very volcanic subject twenty years ago, and how great the improvement in opinion has been. Improvements in methods of investigation and exactness of data. The data on sociology by Herbert Spencer. The natural history of religions. Fossil man. Huxley's opinion on the Neanderthal skull and evolution.
Remarkable Examples of Wind Power. By WILLIAM H. GIBSON. Instructive account of the ravages of the Wallingford tornado in a wood. Century-old oaks overthrown; hickories torn to shreds. Four illustrations of the tremendous destruction of the largest timber.—Color Vision among Savages.
VII. MISCELLANEOUS.—English Missionary School in Syria. 1 illustration.—Hypnotism. The phenomena of Hypnotism, Mesmerism, or Electro-biology, as produced in Animals by Prayer. Czermak's and Fryer's theories. The causes of Hypnotism. The Meteoric Iron of Santa Catarina. By M. STANISLAS MEUNIER. Its composition, and 2 illustrations of specimens.—Modern Conventions. By Bishop CLARKE.—America. What our English cousins say of us.—Postal Business of China.

THE ELECTRIC LIGHT AND THE GAS COMPANIES.—REMARKABLE EFFECT OF A NEW INVENTION IN THE STOCK MARKETS.

The announcement that Mr. Edison has discovered a means for dividing the electric current indefinitely, thereby making it possible to use electricity for lighting small areas, has had a marvelous effect in bringing down the value of gas stocks. The stock of the Chartered Gas Company of London, for example, has been depreciated in the market between five and ten million dollars, if we may trust a statement made before a recent meeting of the company. At an auction sale of gas stock in this city, October 16, shares of the New York Gaslight Company, that on September 11 brought 91 3/4, sold for 78 1/2. Shares of the Manhattan Company that sold for 200 1/2 in September went for 149 1/2. Whether this enormous falling off in value in six weeks is to be charged entirely to the fear of electric competition does not appear; but evidently the larger part of it is, for a similar decline is noticeable in other places. Is there any sufficient reason for it?

The manufacturers of gas say that there is none; that the electric light is simply a co-ordinate branch of illumination, and not nearly so dangerous a competitor as the petroleum light is. The electric light may answer and be economical for lighting large spaces from a single source; but even that is made doubtful by recent improvements in large gas burners, with which the increase in illuminating power is very much more rapid than the increase in the amount of gas consumed. The use of electricity for lighting rooms of moderate dimensions is declared impractical from the difficulty or impossibility of dividing the current sufficiently, and unprofitable from the rapid loss of power when the current is divided at all. As Professor Morton explained lately, when the intensity of the light is diminished by subdivision the percentage of light decreases enormously; so that where a given electric force, applied to one lamp, gives a light, say, of eighty burners, it will with two lamps give only as much light as thirty burners.

Whether Mr. Edison has overcome all these obstacles to the economical use of electricity in small lights remains to be proved. Nevertheless his invention seems to have been the occasion of something like a panic among the holders of gas stocks, a panic which would be foolish even were everything claimed for the invention absolutely true and certain; as a little unexcited thought with regard to the nature of gas, and the vast undeveloped fields of usefulness open to it, will show.

But what is Mr. Edison's discovery? A few words will suffice to give an idea of it. It is based on the well-known fact that a wire may be heated by an electric current, the basis of many attempts to accomplish what Mr. Edison claims to have done. The reader may have seen the gas jets of the dome of the Capitol at Washington, lighted by similar means. Over each burner is placed a coil of platinum wire, which, when heated by the electric current, ignites the gas. Mr. Edison uses the coil itself as the source of light, the current sent through it being strong enough to make the coil white hot, or self luminous. The difficulty to be overcome at this point was the liability of the wire to fuse and spoil the light; a difficulty which Mr. Edison claims to have obviated by the introduction of a simple device which, by the expansion of a small bar the instant the heat of the coil approaches the fusing point of platinum, interposes a check to the flow of the current through the coil. This automatic arrangement, in connection with an auxiliary resistance coil, secures, it is said, an even flow of electricity through the coil, and consequently a steady glow of pure light. If this is done economically it is obvious that a marked advance has been made in artificial illumination.

Must gas go out in consequence? Our opinion to the contrary has already been expressed. The communication from Mr. Strong relative to the use of gas as fuel may be read with interest in this connection; it will be found in another column. The enormous capital invested in gas works and street mains is in no danger of being made useless. Whatever may come out of the electric light, the demand for gas is sure to increase enormously. By recent improvements in the processes of gas-making it has become possible to supply this most perfect fuel at rates which must rapidly do away with all other fuels for most domestic and other purposes; and it is quite possible that the gas that will be required for supplying power for the generation of electricity, supposing the use of electricity to extend as its advocates claim, will amply compensate for all that is likely to be withdrawn from public consumption by the advances of the new light. At all events the holders of gas-stocks will do well not to sacrifice their property in consequence of this temporary and uncalled-for flurry.

PROGRESS IN ENGLAND AND AMERICA.

The Right Honorable W. E. Gladstone, Member of Parliament, and lately the leading spirit in English political affairs, contributed to the North American Review (September-October, 1878) a notable paper entitled "Kin Beyond Sea," a paper chiefly devoted to a comparative study of American and British institutions. Mr. Gladstone saw fit, however, to make a few preliminary remarks, in the course of which, speaking of the United States, he said:

"I do not speak of political controversies between them and us, which are happily, as I trust, at an end. I do not speak of the vast contribution which, from year to year, through the operations of a colossal trade, each makes to the wealth and comfort of the other; nor of the friendly

controversy, which in its own place it might be well to raise, between the leanings of America to protectionism, and the more daring reliance of the old country upon free and unrestricted intercourse with all the world; nor of the menace which, in the prospective development of her resources, America offers to the commercial pre-eminence of England. On this subject I will only say that it is she alone who, at a coming time, can, and probably will, wrest from us that commercial primacy. We have no title, I have no inclination, to murmur at the prospect. If she acquires it, she will make the acquisition by the right of the strongest; but, in this instance, the strongest means the best. She will probably become what we are now, the head servant in the great household of the world, the employer of all employed, because her service will be the most and ablest. We have no more title against her than Venice, or Genoa, or Holland has had against us. One great duty is entailed upon us which we, unfortunately, neglect—the duty of preparing, by a resolute and sturdy effort, to reduce our public burdens, in preparation for a day when we shall probably have less capacity than we have now to bear them."

To the American mind all this seems no more startling or unreasonable than if Mr. Gladstone had stated the commonplace geographical fact that the sun shines every day on America after it has set in England. Bishop Berkeley's star of empire takes its way westward as surely and as inevitably as the sun, and no man deserves any great amount of credit or of discredit for frankly recognizing the fact.

It seems, however, that it is a very risky thing to do in England, particularly if it is done by one in Mr. Gladstone's position. At any rate the British journals express their disapproval of Mr. Gladstone's utterance in as vigorous terms as they have at command.

As Americans we must confess that we see no occasion for such a flurry; much less occasion for accusing Mr. Gladstone of predicting the rapid decadence of his own country. Indeed, it is only too apparent that a determination to find fault with a great man in temporary disfavor for his opposition to the present drift of imperial policy, rather than anything actually said by him, is the impelling cause of this outburst of passion.

It is in the nature of things that, with the life and energy of the Anglo-Saxon race, re-enforced by the best elements of all Britain and half of Europe, with British institutions as a basis, and almost unlimited territory to flourish in, America should ultimately become greater and more powerful than the small island which has hitherto been the center and seat of Anglo-Saxondom. Australia must sooner or later outstrip England in like manner, and Canada also; and who knows what other future nations, speaking English speech, in Africa, Asia, or the islands of the Pacific? Surely every true Englishman must feel that England's highest glory is in these, her stalwart children, whether England maintains political supremacy or not. It must be sheer Cockneyism, inspired by party spirit, therefore, that makes the Graphic "suspect" that hatred of the Americans would be the only outcome of a recognition of the destiny which Mr. Gladstone foresees. The better minds of Great Britain have already adjusted themselves to the existence of the Greater Britain that Sir Charles Dilke has so well described; and the circumstance that the larger part of that Greater Britain was driven to political independence by an old-time attempt to arrest the inevitable, should emphasize the folly of keeping up the needless struggle, even in spirit. It is too late to discuss the question whether America would have been greater or less successful, as a nation, under such government as England now accords her colonies. Had such a policy been possible to England without the American rebellion, the rebellion would never have occurred. As it is, the undetached portions of the Greater Britain are largely indebted to the American colonies for the liberties they enjoy. And England is, to-day, in consequence of America, a greater power than she could have been in the absence of the contributions which free America has made to her commercial and industrial prosperity. If primacy in these fields of human enterprise is to fall to and remain with the United States, the change will be attributable not to England's decay, but rather to the relatively more rapid growth of America, made possible by material advantages and a more numerous population.

THE INCOMING COMMISSIONER OF PATENTS.

The newly appointed Commissioner of Patents, Gen. Halbert E. Paine, brings to his delicate and responsible position an excellent record for capacity and efficiency.

General Paine comes of honorable stock; and from the days when his grandfather thrice removed fought in the old colonial wars, down to the present, there have not lacked men of his name who have ably served their country in the field and in responsible places in civil life. Born in 1826, he was graduated at the Western Reserve College at the head of his class in 185, and admitted to the bar four years later. His military title was won by hard service in the war of the rebellion. Subsequently he was elected to Congress; first to the thirty-ninth, again to the fortieth, and yet again to the forty-first. In his Congressional service the high reputation he had won in the army for sterling capacity and integrity in the conduct of affairs was admirably sustained. He was at the head of the Committee on Militia, served on the Committee on Reconstruction during its whole existence, and was successively member and chairman of the Committee on Elections, in which onerous and difficult position he compelled the admiration of political opponents as well as

party friends. To him is credited also the perfection and passage of the Signal Service Act.

At the expiration of the Forty-first Congress, General Paine refused to stand again, preferring to return to the practice of his profession. He established himself at Washington, where he has since resided. A short time since he was offered the post of Assistant Secretary of the Interior, but declined. His acceptance of the Commissionership of Patents will, we trust, prove eminently satisfactory to himself and to the country.

Touching his plan of action in the new field, General Paine lately declined to speak further than to say that he had given the subject some thought and viewed his approaching duties without apprehension. He knew the position to be an arduous one to fill, furnishing work enough to keep the most ambitious incumbent busy; the arrangement of details he would leave to the observation and conclusions of occupancy. In view of General Paine's long acquaintance and professional association with the Secretary of the Interior, it is believed that his appointment will prove advantageous to the Patent Office, in insuring perfect harmony between it and the ruling department. Inventors, and all likely to have business to do with the Patent Office, will be pleased to know that promptness and thoroughness will characterize the working of the Office under the new rule.

SUCCESS OF AMERICAN EXHIBITORS AT PARIS.

The number of awards to American exhibitors at the French Exhibition has been officially announced, and far exceeds any estimate previously made. They comprise ten grand prizes, thirty diplomas of honor, one hundred and thirty-four gold medals, two hundred silver medals, two hundred and twenty bronze medals, and one hundred and fifty-six honorable mentions. The aggregate is larger than the whole number of American exhibitors at the Paris Exposition in 1867, or at the Vienna Exposition of 1873. Relative to the number of exhibitors the prize winners of America exceed in number those of any other nation. This last point is especially significant, as the highest evidence of the superior character of our mechanical and industrial products. The effect of these victories upon our foreign trade, and thus directly upon our many industries, can scarcely be overestimated.

SHOULD THE NATION ENGAGE IN MANUFACTURES?

The extension of the scope and capacity of our government establishments for the manufacture of military and naval stores, contemplated by the Ordnance Department, has called out a long and very instructive review of the government arsenals and private establishments of the country, will be published in full in the next issue of the SCIENTIFIC AMERICAN SUPPLEMENT. The purpose of the writer is to show that it is neither necessary nor advantageous to the nation to enter thus into competition with private enterprise.

On the score of economy, it is shown that the various articles furnished by the government arsenals cost more and are of inferior quality, compared with the products of private establishments. The estimated cost of the Springfield rifle, for example, at the Springfield armory, is \$54; yet private companies are willing to furnish in quantity an identical arm for \$14. The cost of trowel bayonets to the government is \$4 each; they would be furnished by a Massachusetts manufacturing company for \$2.25. That our private establishments are capable of meeting any probable demand from the nation is evident from the promptness with which they supplied the armies of Russia and Turkey in the late war. It is certain that neither the existing arsenals, nor any that the government is likely to establish, could ever approach our numerous private establishments in capacity, except in the manufacture of heavy guns. The South Boston Iron Company is the only one in the country that has the plant necessary for the manufacture of the heaviest ordnance; and this would probably be rendered valueless if the plan of the Ordnance Department were carried out.

The nations which have the best field guns and heavy ordnance in the world are England and Germany; and their superiority is attributed to the circumstance that those governments have liberally appropriated money for the manufacture of guns, and the contracts have been given to private manufacturers. Had the United States followed their example, it is argued, we might at the present time be exporters of heavy and light guns and carriages and projectiles, and have the whole world for customers, as well as exporters of small arms and small arm ammunition. Whitworth and Armstrong and Krupp are able to supply superior guns for half the world, because their respective governments have aided them by liberal orders. If our government would do likewise, it is claimed, the American makers of heavy ordnance and projectiles would soon be able to compete with the best, and a large foreign trade might be built up. The direct result would be that the country would be far better armed than now, at far less cost, and at the same time the foreign trade made possible would give employment to millions of money and thousands of men.

The government is a large consumer of paper and envelopes; it does not find it necessary, however, to engage in the manufacture of these commodities. By giving its contracts to the lowest bidder the government gets what it requires at much lower rates, probably, than government mills could secure, and at the same time advances private enterprise, instead of counteracting it. True, in selling

stamped envelopes at cost, the government interferes materially in the free competition of envelope makers, and secures to the public a necessary article at prices much below what would otherwise prevail; but that is an incidental feature not likely to arise in the case of other manufactures.

FUEL GAS.

The heating gas made by what is known as the "Strong Process" has recently been the subject of critical scientific investigation by several well-known chemists and experts. The report upon the process by Prof. Gideon E. Moore, Ph.D., is most thorough, and affords ample indorsement of the belief so rapidly gaining ground that the solid must give way to the gaseous form of fuel, at least in our city homes.

Without attempting a general review of Dr. Moore's determinations, it will be sufficient to state that the gas is found to be of the following constitution, having a specific gravity of 0.54008:

Oxygen77
Carbonic acid	2.05
Nitrogen	4.43
Carbonic oxide	35.88
Hydrogen	52.76
Marsh gas	4.11

100.00

This analysis presents a composition, ninety-three (93) per cent of which is formed of the three most valuable heat-producing gases known to science.

Dr. Van der Weyde, whose researches in gas chemistry entitle him to great respect, and who has made the Strong gas the subject of careful study, gives an analysis wherein ninety-six (96) per cent of the entire volume of this gas is composed of the three combustibles named. Upon these determinations we should naturally expect a very high theoretical flame temperature. This Dr. Moore finds to be 5,482.9° F., or about 900° F. higher than that of ordinary illuminating coal gas. Since it is free from what are termed the illuminants, no deposition of carbon is possible during its combustion. These two features—the high calorific power and the smokeless character of the flame of this gas—indicate its superior fitness for a fuel. We are not left in doubt on this point, for a careful observation of its behavior in the melting and puddling of iron and in the raising of steam sustains the inference, in fact forces the conviction, that not only in the arts and manufactures, but more especially in domestic use, it will take the place of solid fuel, provided the question of economy is also clearly established. Concerning this vital point, we print the following letter from the inventor:

OFFICE, 87 ASTOR HOUSE, September, 1878.

To the Editor of the Scientific American:

SIR—The recent announcement in the journals of Mr. Edison's discovery of a way to subdivide the electric current whereby it is practicable to employ electricity for domestic illumination at a fraction of the cost of coal gas, seems to have caused some uneasiness in the minds of the gaslighting fraternity.

Without entering into any discussion as to the merits of Mr. Edison's alleged discovery, or its precise bearing upon the business of gaslighting as now conducted, I desire to suggest the possibility of its being to the coal-gas men a "blessing in disguise."

Should electric supersede gas lighting, how shall the gas companies employ their plant? The coming change from solid to gaseous fuel affords an answer, and suggests a use for their buildings, holders, mains, and meters, both day and night, to an extent far beyond the present service, and at a profit which shall remind them of old times. That a non-luminous gas, similar to that investigated by Dr. Moore, is, in point of efficiency, convenience, comfort, and health, vastly superior to coal in cooking our food and warming our houses, no one can doubt who has any knowledge of the subject. The question is, Will it prove economical?

In England the application of ordinary illuminating gas to fuel purposes has been far more extensive than in this country, and the evidence is conclusive that it is there effecting a decided economy in domestic life. To be sure, gas in London and Liverpool is supplied at about one dollar per thousand cubic feet, but we must not forget that coal is proportionately cheap. In this country, while the use of gas as a fuel has been limited, there is ample evidence that for cooking it is cheaper than coal, even when the price charged is \$2.50 per thousand cubic feet. When I say cheaper I mean *intrinsically* cheaper, and take no account of the collateral points of economy, to wit, that its use saves time and labor, avoids dirt and smoke, and preserves health, comfort, and good temper.

If this be true of illuminating gas, what shall be said of a pure, non-luminous gas, the perfect combustion of which may be attained without the intervention of Bunsen burners or the pre-admixture of air, and which can be supplied to the consumer at one-fifth the price of ordinary coal gas?

Gas companies are not usually communicative as to the cost of gas either in the holder or at the consumer's meter.

Considerable experience enables me to say that in New York and Brooklyn the manufacturing cost of coal gas is not less than sixty cents per thousand, but I desire to be on record as asserting that the heating gas of which we are speaking can be in most of our Northern seaboard cities manufactured and delivered into the holder ready for distribution at a cost not exceeding ten cents per thousand, where the production is equal to one million cubic feet daily.

Your engineering readers can estimate the cost of delivery for themselves, bearing in mind, however, these three important facts: *First*, this gas is absolutely non-condensable in the sense in which that term is usually employed by gas men, and therefore a large source of loss in the distribution of illuminating gas may be ignored in this estimate. *Second*, since the volume of heating gas required throughout a given district will be largely in excess of the volume demanded for light, the percentage of leakage through defective mains will be proportionally less. *Third*, the loss in dollars and cents by leakage will be in proportion to the respective cost of the two gases.

Truly yours,

M. H. STRONG.

AN IMPROVEMENT ON TEA CHROMOS.

The desire to have something "thrown in" with every purchase, a desire apparently very prevalent among the less intelligent classes of humanity, leads to some comical results in trade. Multitudes of people have cheerfully paid two dollars and a half for a paper they didn't want, for the sake of getting a fifty cent chromo. And to judge from the windows of uptown tea and coffee shops and corner groceries, the gift of a ten cent picture or a chance to win a pair of ugly vases is a much more powerful attraction to small buyers than superior goods or moderate prices. The absurdity of expecting shop keepers to give away something for nothing, even when that something is intrinsically worthless, does not seem to appear to the customers of such prize giving shops. They always have something thrown in, and that insures a good bargain.

The practice began, we believe, in England, where it is still a profitable "dodge." The only drawback seems to be that people ultimately get their houses fully stocked with pictures and other trumpery, and then they want something more substantial. This has led a Glasgow house to introduce a "new system," which consists in giving each buyer of tea the sugar to sweeten it "for nothing," at the rate of four pounds of sugar for one pound of tea. How much more than the cost of the sugar they add to the price of the tea they prudently refrain from telling. Not to be outdone, a Swansea tea company offer to give on certain days a hat worth five shillings with every pound of tea, or if the purchaser prefers, a splendid silk necktie.

This is much better than chromos, even if the hat is not a work of art; and doubtless the tea is just as bad in the new system as in the old.

It is one of the misfortunes of people of narrow means that they have to buy the necessities of life in small quantities, the ratio of profit to the seller usually increasing with every diminution of the size of the package. Yet it is safe to say that most poor people pay far more for their limited purchases than they might, were their buying more intelligently done. Indeed a frequent cause of poverty is the inability to turn thriftily the proceeds of industry. They never learn the lesson that while it is pleasant to think that the sugar is "thrown in" with the tea, they are sure to have to pay for it, perhaps doubly.

A SOUTH AUSTRALIAN OFFER FOR AN IMPROVEMENT.

South Australia is rapidly becoming a great grain-growing country; and, like all new countries, finds its capacity of production most seriously limited by the lack of labor, more correctly perhaps by a lack of labor low priced enough to enable producers to get their products to distant markets at a profit. The only solution of this difficult problem lies through the use of machinery which will make the labor of one man produce as much as many men can unaided. And lying further from the great grain markets of the world than other great grain producers, Australia has the more urgent need of machinery which will lessen the cost of her staple cereals. Accordingly the government of South Australia has offered a reward of \$20,000 to the inventor of the "best machine combining within itself the various operations at the same time of reaping and cleaning, fit for bagging on the field, the various cereal crops of South Australia."

The competitors for the prize will be tested in December, 1879, with especial reference to their strength, durability, lightness of draught, cost, work done, results of cleaning, and simplicity. To win the prize the successful machine must be an improvement on any in use in the province; and then the bonus will be paid over only on condition that the successful competitor is debarred the privilege of patenting his machine. In other words, he will be allowed to patent his machine only on condition that he declines to receive the bonus.

To what extent American machines, accomplishing the ends in view, have been introduced into South Australia, we do not know; it is evident, however, that the competition, if there be any, will lie between such machines and possible improvements of them. It is evident, also, that the successful competitor will gain the lead in a very wide and advantageous market, from which the profits are likely to be far greater than the bonus offered. Our manufacturers and inventors may find the field worth cultivating.

A Correction.

Owing to the indistinctness of the photographs from which were made the drawings illustrating a horse's motion (SCIENTIFIC AMERICAN, October 19), the figures D and 9 were incorrectly drawn. It is clear, from a more critical study of the different strides, that the positions of the fore legs in D should be reversed, that is, the right leg should be straight and the left bent. Again, in 9, the left fore leg should be advanced and the right bent under the body.