

Correspondence.

The Extermination of the Buffalo.

To the Editor of the SCIENTIFIC AMERICAN:

After perusing "The Crime of a Century," written by Prof. Charles Frederick Holder, published in the SCIENTIFIC AMERICAN of December 9, 1899, I am of the opinion that his article is a product of sympathy and love of natural existence. There is no doubt that had the Professor gone deeper into the question of extermination, he would have arrived at an entirely different conclusion. I will endeavor to correct some of the errors of Eastern antiquarian sympathizers by giving, from a practical and scientific standpoint, the opinion of men who have watched the decline and fall of the bovine race, and noted the progress of westward expansion.

From the authority of an army officer, Prof. Holder, speaking of the buffalo, said, "If any one had told me then that in twenty or thirty years they would have become almost entirely extinct, I should have regarded the statement as that of an insane person." Had he said, "If any one had told me then that in twenty or thirty years those vast plains would have become peopled by the human race, laid out in homesteads and ranches, with a church on every hill-top, and a school in every valley," who would not have regarded the statement as that of an insane person?

In obedience to the philosophy of the survival of the fittest, the van of Western emigrants sounded the knell of the buffalo herds.

After considering the treatment of a few army officers, by being corralled for days and weeks on the open plain or in some gulch, or of some Kansas Pacific train derailed by their terrible onslaughts, what rational mind could look with favor on a great herd of probably a million buffalo charging madly upon every settlement and line of fence from Minnesota to Texas? Think of a million buffalo on their semi-annual migratory tours charging through your own country with their rank and file extending in every direction as far as your eyes can behold, your buildings, gardens and fields ground to dust beneath their myriad feet, your wives and children fleeing for protection at the sound of their approach. I wonder how the professor would like to have the pleasure of witnessing such a spectacle from the heights of the Catskill Mountains. Yet, such would have been the condition of affairs on the Western plain to-day had not the buffalo been exterminated. Had he not succumbed to the crack of the sportsman's rifle, his doom would have been sealed a short time later, when man came to dispute his claims.

After the buffalo had performed his act in aiding and assisting in the development of the country, his skin paid the expenses of his removal. Some may ask: Why was he not domesticated? In a country where land produces from 40 to 100 bushels of corn, and 1 acre of pasture land would put on 200 to 400 pounds of beef in a year, would it pay to raise animals whose chief value lies in their covering, estimated at \$2.50 to \$5? No! Decidedly no! Their domestication would have proved unprofitable.

On the broad prairies, stretching from the Mississippi River to the foothills of the Rockies, there exists in a state of domestication a race of animals far superior to the buffalo in quantity and ability to supply the wants of mankind. Where once roamed unfettered the pioneer of the prairies, now graze in quietude countless flocks of sheep and herds of cattle. Enough buffalos still remain for museum purposes.

If the Professor desires to witness a specimen of the successor of the buffalo, I refer him to Armour Rose, a Hereford heifer that sold at Kansas City for \$2,500. She holds the place of one extinct buffalo. In the study of the history of human progress, when any animal becomes useless or inferior to other animals of its class and species, it is not only natural, but right, that their race give way to the survival of the fittest. A moderately small herd of buffalo on the Missouri River would be as entirely out of place as a band of Comanches turned loose on the Hudson.

The white man, by his industry, energy, and superior mental ability, has robbed the Indian of his birthright. No rational mind can entertain any other conception than that the buffalo were exterminated in direct obedience to the laws of nature. Their extermination was not a crime, but a necessity.

Ford City, Mo.

GERALD LIVERGOOD.

A Decision Affecting Forfeited Applications.

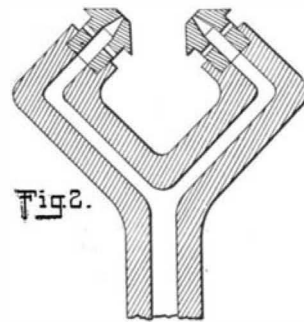
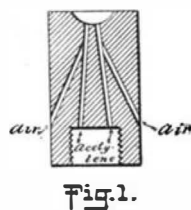
The Court of Appeals of the District of Columbia has held, in the case of Christensen v. Noyes (C. D. Ms. Dec. 472), that where an applicant has permitted his application to become forfeited by failure to pay the final fee within the time prescribed by law, but has subsequently renewed the same, the constructive reduction to practice afforded by the filing of the original application will not defeat a patent granted to another before the renewal, upon an application filed subsequently to the filing of the original application, where the subsequent applicant was the first to conceive the invention and was also the first to actu-

ally reduce the same to practice. Applicants should therefore be careful not to allow their applications to become forfeited after allowance, but should see to it that their applications are diligently prosecuted until the final grant of the Letters Patent.

THE EXPLOSIVE SIDE OF ACETYLENE.

BY FREDERICK H. M'GAHIE.

In a recent number of the SCIENTIFIC AMERICAN SUPPLEMENT, the writer gave, under this heading, a summary of the facts that scientific investigation had determined in regard to the explosive properties of pure acetylene and its mixtures with air. These experiments have given the limits within which the new illuminant must be produced and utilized to avoid dangerous and uneconomical conditions. Some cases deviating from those treated possess much interest in having found practical application and having been studied from the point of view of possible explosion. Special burners have to be used with pure acetylene, as the ordinary ones do not give satisfaction with regard to illumination or economy. There is a deficiency in the supply of oxygen afforded by their construction, and combustion with them is not sufficiently complete to give rise to the temperature needed to carry to incandescence the large amount of carbon contained in acetylene. The first solution consisted in making the burners with holes permitting air to be drawn in and mixed with the acetylene just before combustion (Fig. 1). Such would act satisfactorily for a time and then begin to clog up and give a weakened, smoky flame. By adding 15 to 30 per cent by volume of nitrogen to acetylene, Bullier was able to employ ordinary burners. Others have proposed carbon monoxide, carbon dioxide, hydrogen, water-gas, as diluting agents. Of these, Prof. V. B. Lewes, Gas Engineer for the City of London Authorities, has stated: "The great trouble which has presented itself in diluting acetylene with any cheap diluent is that the illuminating power of acetylene is reduced to an enormous extent, and it has been found that hydrogen, carbon monoxide, and water-gas are useless for this purpose, as 10 per cent of acetylene mixed with either of them gives a practically



non-luminous flame, while if the acetylene is used in sufficient quantity to give a satisfactory light, the percentage of acetylene needed is too high to be commercially possible."

Prof. Lewes made a long series of experiments to discover a cheap diluent that "would maintain the enrichment value of acetylene at something near the value of the gas when burned alone." His conclusions were that "methane was the only gas that would do the work required, and further that the presence of 30 per cent of methane when mixed with hydrogen, carbon monoxide, or water-gas converted it into an excellent diluent, with which 10 per cent of acetylene gave a 20 candle-power gas capable of being burned in ordinary gas fittings." He found that each 10 per cent of diluting gas mixed with acetylene raised the temperature necessary to originate explosion 180° F. The practical value of this investigation lies from our point of view in the fact that a mixture containing enough acetylene to make a brilliant illuminant for railroad lighting can be compressed and utilized safely, since the temperature needed to cause explosion is high enough to melt the metal cylinders carrying the compressed gas. Such a system has been introduced with satisfaction on the street railways in Prussia. The preliminary tests were made by the Julius Pintsch Company, of Berlin, and the Prussian railway management in common. The conclusions of Berthelot and Vieille in regard to the explosiveness of acetylene were confirmed by these experiments. A tank was filled with acetylene at six atmospheres pressure, and a small pipe entering the tank was brought at a point 59 inches from the tank to a red heat by a gas flame. A violent explosion followed. Another tank was filled with acetylene at a pressure under two atmospheres and a pipe heated as before at a point 59 inches from the tank to a white heat. Local decomposition took place in the pipe, but no explosion occurred. With mixtures of 30 per cent acetylene and Pintsch oil gas or coal gas compressed to as high a degree as was desirable, it was found that the fusible solder used in the joints of the tank would melt long before a temperature involving explosion of the compressed gas could be reached, and, further, that explosion did not result from heating highly the pipes leading to tanks so filled. For the small generator involved in the lighting of

country houses by acetylene, the above methods are not available, and pure acetylene must be burned to secure a maximum simplicity of system. There are now satisfactory burners based on the principles of the one shown in Fig. 2. The escaping acetylene draws in air for mixing with itself, and the two jets impinge upon each other to form a vertical flame at a distance from the burner sufficient to avoid the overheating of the tops, with the consequent formation of the condensed polymers of acetylene, such as C_6H_6 , C_8H_8 , that causes smokiness and clogging up with the burners of Fig. 1 type. It has been proposed to mix air in proper proportions for good combustion in usual gas fixtures with the acetylene after its generation and a simple apparatus to this effect has been patented by Dickerson. But it involves an element of danger in introducing an explosive mixture into the distributing part of the system. The air can be mixed with the acetylene all right in the small passages of the burner, since the explosive laws of large masses do not hold in small tubes. Le Chatelier found that in tubes with diameter not exceeding 0.02 inch any mixture of air and acetylene would not propagate explosion. The influence of the diameter of tubes is shown in this table determined by him:

Diameter.	INFERIOR LIMIT OF INFLAMMABILITY.	SUPERIOR LIMIT OF INFLAMMABILITY.
	Percentage Acetylene.	Percentage Acetylene.
0.03 inches,	7.7	10
0.08 "	5.0	15
0.78 "	3.5	55
1.57 "	2.9	64

There are some who hold that compressed, and even liquefied, acetylene has a future. For compressed acetylene gas Claude and Hess have brought forward a method possessing distinct advantages, that of dissolving acetylene in acetone. At 60° F. acetone dissolves about 26 grammes of acetylene per liter, for each atmosphere of pressure, the factor decreasing with elevation of temperature. Berthelot and Vieille investigated this case to determine the conditions of explosion. They found that the acetylene gas above the liquid acted the same as pure acetylene and would, therefore, detonate by a spark at two atmospheres and above. At pressures up to 10 atmospheres, the acetylene dissolved in the acetone will not explode either through the detonation of the free gas or through the action of a highly incandescent wire placed in the liquid. Above 10 atmospheres a danger region is approached. In experiments at 20 atmospheres pressure inflammation of the free gas gave rise to an explosive pressure of 550 atmospheres. Since the decomposition of acetylene at 20 atmospheres would give around 200 atmospheres pressure, it is evident part of the dissolved acetylene participated in the action. When the inflammation was provoked by an incandescent wire in the liquid part, a pressure of about 5,000 atmospheres was observed. In using cylinders charged according to this system it is imperative to take into account the fact that the pressure increases rapidly with the temperature. In the charged cylinder experimented with, a pressure of 6.5 atmospheres at 57° F. became respectively 8.4 atmospheres at 80° F., 10.2 at 96° F. and 15.8 atmospheres at 140° F. It is desirable then in using acetylene dissolved in acetone to fix the charging pressure at 7 to 10 atmospheres calculated for 60° F. in order to obviate the danger of charged cylinders reaching through exposure to the sun or through being in the vicinity of some source of heat a pressure at which the dissolved acetone would take part in any explosive decomposition. These figures have been given to exhibit the great increase of storage capacity afforded by the system. A cylinder of one liter capacity carrying 0.7 liter of acetone saturated with acetylene at 7 atmospheres pressure will carry 127 grammes of acetylene. The same cylinder will contain but 11 grammes of acetylene gas compressed to 10 atmospheres. If explosion should occur in the free gas of a cylinder properly charged, the maximum pressure obtainable would be below the safety limit of the cylinders employed and the dissolved acetylene would be still available. The advocates of this acetone-acetylene method hold that it gives an excellent solution of the problem of storing acetylene in a condensed state in cylinders for subsequent transportation to any place where it is desired to feed a receiver, that it is more economical and safe than acetylene compressed in the ordinary manner, and that it is practically free from all danger in the hands of the skilled workmen who would handle the cylinders. Those who believe in the possibilities of liquefied acetylene have invented valves which make it impossible for ignorant workmen to open them too quickly and to bring about thereby the danger of adiabatic compression in the gaseous column to a degree involving explosion.

THE French government is building four submarine boats of the "Goubet" type. Several submarine boats of the type of the "Narval" are also to be constructed if the trials which are now in progress prove satisfactory.

Science Notes.

Prof. Edward Orton has been appointed State Geologist of Ohio, to succeed his father, the late Edward Orton. Prof. Orton is a thoroughly competent geologist, and since 1894 he has been director of the department of clay making and ceramics in the Ohio State University. We have already published in SUPPLEMENT, No. 1248, an illustrated article by Prof. Orton on his remarkable ceramic school.

A pharmacy has been opened in New York city which is entirely different from the ordinary drug store. Nothing is sold in it except appliances, apparatus and drugs, etc., which are intended for the relief and comfort of the sick and invalid, and all the time and attention is devoted to the compounding of prescriptions, the examination and analyses of substances for physicians and their patients, and, in fact, says The Pharmaceutical Era, it is the exemplification of a thoroughly modern scientific pharmacy. It contains also a novelty in the way of a pharmaceutical library. Simple chemical processes in operation are displayed in the window.

The Division of Botany of the United States Department of Agriculture is at work to reduce the importation into the United States of some of the little things which have been costing the Americans \$8,000,000 annually. Western States are now growing chicory. In 1896, 16,317,388 pounds were imported, but in 1898 only 315,707 pounds of raw chicory were imported. The Division in Botany is also making tests to protect farmers and merchants against foul and fraudulently imported seeds and test the importations of the department before distribution. The current SUPPLEMENT contains an elaborate résumé of the work carried on by the department during the past year.

Henry Savage Landor, traveler and author and now lecturer, has arrived in this country. We had the pleasure of reviewing Mr. Landor's remarkable book in our SUPPLEMENT, No. 1197, and we dare say there will be many in this country who will be pleased to hear Mr. Landor's remarkable adventures in Thibet from his own lips. He is only thirty-three years old, and since he was a very young man was fond of going among strange peoples. He has been in China, Japan, Kamchatka, the Kurile Islands, Mongolia, Australia, India, Nepal, Thibet, and Northern Africa. His adventures in Thibet are, of course, most thrilling. We learn that Mr. Landor went to Thibet last summer, but had no serious trouble.

An Austrian savant has declared that the human brain contains a "name center." He says that it is the office of this cell to retain names. A striking case which would seem to confirm this theory recently occurred at Cleveland. A brakeman was shot by a conductor, and the former could not remember the names of persons or things, although he could perfectly well describe the functions of all articles exhibited to him. The surgeon probed for the bullet and found it in the exact spot necessary to affect the remembrance of names, according to the Austrian's theory. When the pressure on the brain had been relieved, the patient remembered names as well as he had done before his injury and told the name of his assailant.

The French Commissioners of the Paris Exposition propose to make the official catalogue an interesting example of French taste in printing and bookbinding. It will be practical in size and contents and will not be expensive. It will be composed of eighteen volumes, one for each group in the general classification. Each volume will contain a general plan of the Exposition and a special one of the group to which the book belongs, the latter plan enabling visitors to find at once any desired exhibit. For each class the volume will contain a historical notice of the productions of that class, a catalogue of the retrospective exhibition, catalogue of French and foreign exhibits and an alphabetical list. The matter is to be furnished by persons specially competent to deal with the subject. The new catalogues will undoubtedly prove most valuable and will be in marked contrast to those which have been issued at the last International Exposition.

A recent paper read before an English society deals with the chemical effect of a high tide on 30,000 acres of Essex soil. The salt water injury lasts, according to various authorities, from five to twenty years. After the water had run off, it was found that there was two per cent of the salt in the soil, twenty times the normal amount, but not directly injurious. The damage seems to be chiefly due, says Engineering, to the entire destruction of the earth worms. The 1898 crop was very poor, and this spring the state of the soil was also very unsatisfactory, still earth worms began to appear, and nine-tenths of the salt has been washed out by rain. Apparently the clay has become gelatinous, owing to the action of the chlorides on the silicates, the silicate of alumina remaining behind, while the other silicates are greatly reduced in percentages. The proper treatment seems to be to plow in green crops, dressing with lime and potash and manuring.

Engineering Notes.

Most railway lines have a large percentage of their cars equipped according to the provision of the safety appliance act, but there are only six lines which are able to report that all of their cars are so equipped.

In Russia in the principal towns fire engines are used which were manufactured by British, Swedish and German firms. The Swedish engines are much cheaper than either the English or German machines.

Coal mining is developing rapidly in Canada. In Nova Scotia both the areas worked and the number of mines show a great increase. The coal areas of Canada are estimated at 97,200 square miles, not including areas known but as yet undeveloped in the far north.

In Japan a railway train was blown from a bridge on October 6. The train consisted of two locomotives, three freight cars, and four passenger cars carrying eighty passengers. While crossing an iron bridge the whole train, with the exception of the locomotives, was blown from the bridge into the stream below.

The Philadelphia Commercial Museum is asking an appropriation of \$200,000 from Congress, to be used to collect samples and data in foreign countries for the use of our manufacturers, to employ experts in foreign ports for the extension of American trade and for the publication and free distribution of all the information collected to every chamber of commerce and board of trade in the country.

There are now three Scherzer bascule bridges across the Chicago River, one being a four-track railway bridge, while the others are highway bridges. Two other bridges of this type are to be erected to replace the old swing bridges. The center piers are to be removed in order to give the river the necessary capacity of flow required for the Chicago drainage canal.

The Hamburg-American line and the North German Lloyd are each having two new vessels fitted with ice-making and refrigerating machinery. In addition to the usual cooling rooms and ice-making plant, two of the staterooms are cooled artificially. This is said to be the first case in which staterooms have been cooled with the aid of refrigerating machinery.

The new French submarine torpedo boat "Narval" has serious defects and is not as successful as when first reported, and an order has been issued to cease working on the two sister boats until the defects in the "Narval" have been remedied. The chief difficulty seems to be in changing the motive power from steam, when the vessel is traveling on the surface, to electricity, which is used while she is under water. During the trials it was found that the change was made slowly and was unsafe.

Representatives of Bombay commercial houses have placed orders with several manufacturing firms for American textiles to the value of half a million dollars. The Indians are high in their praise of American goods, and they seem anxious to further trade relations between America and India. A scheme for the establishment of two lines of steamers between Bombay and ports on the Atlantic and Pacific seaboard is under discussion. At present tramp steamers carry all the cargoes that are shipped direct to Bombay.

A large refrigerating plant will soon be erected at Manila. The building will be 250 feet square and 45 feet high and will be located on the bank of the Pasig River. The cooling room will be large enough to contain at once 5,000 beeves, 7,500 sheep and 100 tons of salt meats, butter and eggs, and vegetables enough to supply the American army in the Philippines for some time. The plant will also produce 50 tons of ice daily and 6,000 gallons of distilled water. By means of the railways the troops can be supplied with fresh meat and vegetables daily, and the hospital can be furnished with the best of food and even delicacies and plenty of pure water and ice.

On December 21, the torpedo boat "Shubrick," which was launched October 30, came very near being destroyed. The boat, which is about 90 per cent finished, was lying at the dock at the northern end of the shipyard, where a high trestle of the Chesapeake and Ohio Railway runs parallel with the dock and a few feet from it. A long train came down the incline and some of the cars broke loose and ran down and piled themselves on the top of the trestle, and a box car loaded with seeds dropped into the dock between the "Shubrick" and an ice barge in a space just large enough to miss both the vessels. The car struck within one foot of the "Shubrick."

According to The Engineer, the manufacture of domestic utensils of aluminium is making great strides in India. There are several centers of trade, and the more general adoption of the metal is being hastened by the high price of copper and tin. The School of Arts in Madras, where the work was originally started, has recently filled a large order for cooking vessels for a regiment of infantry. These vessels have, almost of necessity, to be made by hand, since each new regiment

has its own patterns. The great difficulty is the production of a suitable water bottle, as the flat pattern is not easily made in aluminium, since soldering cannot be used, while the cylindrical pattern cannot be conveniently carried.

Death of Elliott Coues.

Elliott Coues, the naturalist, died at Baltimore on December 25, and in his demise American science has lost another of her greatest men. He was born in Portsmouth, N. H., in 1842. His father Samuel Elliott Coues was the author of several scientific treatises of great value, so that Elliott Coues the younger came naturally to study science. He graduated from the Columbian University in 1861, and from its medical department in 1863, and entered the United States Army as medical cadet and was appointed by Surgeon-General Hammond as Assistant Surgeon in the United States Army, retaining that office until his resignation in 1881. His first post of duty was in Arizona and then in Colorado and Illinois. In both stations he investigated the natural history of the region and published several important papers. In 1873, he was appointed Surgeon and Naturalist of the United States Northern Boundary Commission, which surveyed the line along the 49th parallel from the Lake of the Woods to the Rocky Mountains. After his return to Washington he published, in 1872, his "Key to North American Birds," and in 1874, "Field Ornithology." His reputation as a naturalist now became thoroughly established and he was appointed as secretary and naturalist of the United States Geological Survey under the late Dr. F. V. Hayden. He edited the publications of the Survey from 1876-1880, meanwhile conducting explorations in the West. He published "Birds of the Northwest" in 1874, "Fur-Bearing Animals" in 1877, and "Birds of Colorado Valley," 1878. He was ordered by the War Department to the frontier, but his services to science were so important that he tendered his resignation and continued his scientific career. He was a member of most of the scientific societies of the United States and many of Europe. He was elected to the chair of anatomy at the National Medical College, in Washington, and pursued some of his favorite studies for ten years, teaching human anatomy upon the broad basis of morphology and upon the principle of evolution.

A Great Collection of Fossils.

The American Museum of Natural History is most fortunate in acquiring, through the generosity of President Jesup, the second half of the Cope collection of fishes, amphibians, and reptiles brought from Kansas, Colorado, Wyoming, Montana and other sections of the West between the years 1867 and 1896. In 1895 the first part of this collection was presented to the Museum by the trustees, so that now the entire life work of the great archæologist, the late Edward Drinker Cope, will be permanently represented here. The collection is a most remarkable one and would give celebrity to any scientific museum in the world, as it practically covers the history of life upon the North American continent for a vast period of time. The new collection, it is expected, will be sufficient to fill one of the large new exhibition halls. The proceeds of the sale of the collection will form an endowment fund for a professorship of natural science in Philadelphia.

Preserve Your Papers.

By taking a little trouble, when a paper first comes to hand, it may be kept in a way to form a permanent and most valuable addition to the reading matter with which all families and individuals should be supplied. We furnish a neat and attractive cloth board binder, which will be sent by mail prepaid for \$1.50. It has good strong covers, on which the name SCIENTIFIC AMERICAN or SCIENTIFIC AMERICAN SUPPLEMENT is stamped in gold, and means by which the numbers may be securely held as in a bound book. One binder may thus be made serviceable for several years, and when the successive volumes, as they are completed, are bound in permanent form, the subscriber ultimately finds himself, for a moderate cost, in possession of a most valuable addition to any library, embracing a wide variety of scientific and general information, and timely and original illustrations. Each binder holds two volumes, all the numbers for one year. Save your papers!

A REQUEST has been made to the trustees of Princeton University to allow the valuable apparatus shown in our issue of December 23 to be placed on exhibition at the Paris Exposition. The instruments, which include the great magnet and the induction coil, are of great value and are of enormous importance in the history of American science, and it is gratifying to note that the trustees have decided not to allow them to be sent to the Exposition. The loss of the Volta relics at Como was a public calamity.

EXPERIMENTS with wireless telegraphy at Orange River, in South Africa, have been most successful. Perfect communication was maintained with De Aar, 70 miles distant.