

## Correspondence.

## The Protection of Inventors.

To the Editor of the SCIENTIFIC AMERICAN:

Yours containing several copies of your "Patent Tricks" received and same forwarded to Hon. P. M. Jack, House of Representatives, Washington. He writes me saying he has received them and will do what he can in the matter. My own idea is that if a reprint of "Patent Tricks" was inclosed with every patent sent out from the Patent Office, that department would at least have done its duty in warning its patrons of the traps and swindles awaiting them. Letters to Congressmen in cases of this kind have great backbone stiffening properties, and one from you would, I think, have considerable weight.

EDWARD ROWE.

Indiana, Pa., January 8, 1900.

## Liquid Air as a Blasting Agent.

To the Editor of the SCIENTIFIC AMERICAN:

In an article that appeared in your columns some months ago, I stated what was known about the trial of a liquid air explosive in the blasting operations connected with the construction of the Simplon Tunnel. There is an interesting article in the January number of Cassier's Magazine, dealing with the engineering features of this work. Some additional facts are given in regard to the liquid air explosive, the most interesting being contained in a foot-note. It is that the new explosive has been abandoned. It is to be remembered that the conditions surrounding its trial were especially favorable to it. This constitutes another "hard fact" to be pasted on the prospectuses of the heavily capitalized liquid air companies that are now most generously offering the investing public a chance, to share in the marvelous profits that must accrue to stockholders—if there were not so many hard facts that financial verbiage cannot down.

January 8, 1900.

FRED. H. MCGAHIE.

## HOW A WEATHER MAP IS MADE.

In most of our large cities weather maps are displayed daily in all public places and they are of great interest, not only to amateur meteorologists, but to the general public as well. Of course, the average person cares more about forecasts than he does about the map proper, but at the same time the number of those who daily consult the weather map is large. In New York city the Weather Bureau is on the top floor of the American Surety building, and the active work of forecasting and the preparation of the weather map is carried on in these rooms, while the observations are made on the roof. The local forecast official and his assistants reach the office early in the morning, for the forecasts are issued about 10 A. M. and maps are issued to the public about 11 o'clock, and a vast amount of preliminary work must be done. In addition to the local observations taken by means of self-recording instruments, telegraphic messages are received showing the observations taken at 8 o'clock A. M. in seventy-six stations of the United States; observations from Sandy Hook are also telegraphed in. Messages from the observing stations are all telegraphed to Washington and are in turn transmitted to all of the important stations from which weather maps are issued.

The Weather Bureau possesses a remarkable code system of telegraphing. The exact condition of the weather of New York city might be given by the following cipher telegram: "YORK-BINNACLE-HUNNEWELL-RENOVN-OUTMOST-FOG-PERMIT." Messages of the same length from each station are received by the telegrapher, and from these messages the observer, or the local forecasting official, as he is termed, makes up his weather map and from them he gets valuable information for his forecast as to meteorological conditions all over the country.

We will now analyze the telegraphic cipher report of the observations given above. "York" is simply the cipher-address indicating the location of the station; the word "Binnacle" is a special code word for both the barometric pressure and the temperature. If, for example, the barometer should be stationary for two or three days, and the temperature varied, different words would be used each day at the same time; a syllable of the word telegraphed each day would indicate a stationary barometer, while a key to the changing of the temperature would also be given. In "Binnacle" the first two letters, "BI," mean 30.16 inches barometric pressure, and "NA" indicate a temperature of 62 degrees Fahrenheit. The next word, "Hunnewell," refers to precipitation, the "NE" being the significant syllable indicating a precipitation of 0.64 inch. In morning reports "H"-words are used, and at night "L"-words are used. The word "Renown" indicates the direction of the wind, the state of the weather and maximum temperature for the last twenty-four hours. If the word begins with "R," it is understood that the wind is west, but if the word begins with "F," the wind is east. The "E" following the "R" indicates cloudy weather, while the syllable "NO" indicates a maximum temperature of 68 de-

grees. The word "Outmost" refers to the velocity of the wind and the minimum temperature for the last twelve hours. The word "Fog" is not a cipher word, and fully explains its meaning. The word "Permit" means that the maximum wind velocity in past twelve hours was 56 miles from the west. The observers are very expert in handling these ciphers, and a message of this kind is translated almost always without the aid of the large code book. The code system, as has already been said, is most elaborate, and is based on the value of certain letters in certain positions. Thus, A=2, E=4, I=6, O=8, U or Y=0, B=1, D=2, F=3, G=4, M=5, N=6, R=7, S=8, T=9; thus, in the word "Binnacle" the "NA" will be seen to have the value of 60+2, which, of course, means 62 degrees, the "A" being in the units place.

With the aid of all these observations, which are taken from telegrapher to the forecaster, the latter makes his map.

Blank weather maps are used, and he indicates on one of them the various barometric pressures and temperatures. He then draws the "isobars" or continuous lines on the map which pass through points of equal air pressure. He then draws on another map, with a different colored pencil, the "isotherms," dotted lines which pass through points of equal temperature. Various symbols indicate the state of the weather. Thus, a circle indicates "clear;" if one-half of it is black, it is "partly cloudy," or if all black, it is "cloudy;" an "R" within a circle means rain; "S," snow; and if a report is missing, an "M" is put in its place. An arrow which passes through a circle indicates the direction of the wind.

As soon as a map is made in manuscript, it is given to an engraver, who transfers it to a chalk plate. He uses three maps for the purpose, one showing the state of weather and the direction of the wind, one for the isobars and the other for the isotherms, and, while he is doing this, the forecast official is making up the forecast for the day.

The chalk plate process is very rapid, and has been found to possess marked advantages over the old styles of duplication, in which stencils were perforated, as in the neostyle and cyclostyle processes. In brief, the chalk plate outfit consists of a blued steel plate covered with a composition unaffected by heat, which adheres firmly to the plate. The composition can be made of various materials; an article on the



STEEL STYLUS FOR CHALK PLATE WORK.

subject was published in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 720, dealing with the technical side of the composition. The idea of the process is to scrape away the portion of the chalk covering where the lines or lettering are to appear on the printed map. This is done with the aid of a stylus which somewhat resembles a bent pin. A new plate is used for each map, and the composition is then scraped off and the plate is sent away to be recoated. The engraver places one of the maps over the plate and lightly scores the various points which he is to engrave with an agate stylus. It should be understood that the plate when finished will consist only of lines, symbols and figures. The map proper, showing the contour of the country, its political divisions, cities, natural features and observing stations, is, of course, lithographed in large quantities and sent to the observing stations.

A small steel instrument is used to make the circles. This instrument somewhat resembles a small pair of compasses and rests on a large foot to avoid removing any of the chalk surface. After the circles have all been put in, the operator indicates the state of the weather, that is to say, he may scrape out all of the chalky material which the circle circumscribes, thus indicating rain, or only one-half of the circle may be taken out, indicating partly cloudy. Letters in the circle where necessary are put in with a stylus, and the direction of the wind is then indicated by oblique lines and arrows. In doing this work a stylus provided with a rubber tube is used. The engraver squeezes a bulb connected with it, and the air passes down the handle of the stylus and through a small opening and serves to blow away the chalk dust caused by the cutting. After this is completed he then takes the second map from the forecast official, showing the isobars. They are transferred to the chalk surface with the aid of a stylus, as above. They are rapidly cut out by one of the steel points as shown in our engraving. It does not usually take more than three or four minutes to perform this operation. The barometric pressures are then written in with the aid of the ordinary stylus.

The map containing the isotherms is then treated in the same way, and the temperatures are located on the map at the termini of the lines. What are termed "highs and lows" are then put in. These words are printed from type at the proper parts of the map. A small portion of the chalk is scraped away to admit of a slug, and after the casting this slug is knocked out and the type word cut in brass is inserted. The plate

is then dusted off and is taken to the basement, where it is put in a casting box, and, after being warmed, hot stereotyping metal is poured on the face. Wherever the steel point has removed the chalk surface the metal flows, making a sharp cast. After cooling, the stereotype plate is removed, and it is then sawed to shape with a jig saw. It is secured to the press by lugs cast on the plate, and the brass type is inserted in the three or four places which have been left for them by the slugs. The printing press is across the hall from the offices, and it has the unique distinction of being the highest printing press in the world as far as being artificially raised is concerned, as it is nearly 300 feet above the street. It is driven by electricity, and as fast as the maps are printed off they are at once put up in wrappers and are sent out to the post office.

The bottom of the weather map contains the forecast, a brief note on the weather conditions, and the observations taken at eight A. M. from all parts of the country which have been received in cipher by telegraph, as already explained. About 800 of the maps are issued in New York, and they are usually all printed by eleven o'clock. The forecast is usually completed by half past nine o'clock; the maps are sent to various hotels, public buildings, etc., where they will be displayed for the benefit of the public. They are sent by mail and are treated as first-class matter. The Weather Bureau is connected with the telephone exchange, and a large number of forecasts are given out over the telephone to inquirers. We are indebted to Mr. E. H. Emory, local forecast official at New York city, for courtesies in preparing the present article.

## Automobile News.

During the month of December, according to the Paris edition of the Herald, 708 accidents were caused by horses, resulting in 52 deaths and 656 injuries. In the same period there were only 21 automobile accidents and only one death.

From a picturesque point of view the old stages will be missed from Fifth Avenue when the new automobile stages are introduced, but the advantages will be much greater. A conductor will necessarily have to accompany each omnibus, and the driver will no longer be compelled to dole out tickets and change in envelopes, but can give his undivided attention to running the vehicle.

In a recent article in The Medical News, Dr. J. J. Walsh points out that there are certain diseases which will greatly diminish as the result of the absence of the horse from the city's streets. Tetanus, for instance, will probably disappear almost completely. It is on horse fodder that the germ is introduced into cities, and with the elimination of the horse, that dread disease lockjaw will probably almost disappear.

In Paris an automobilist was driving an automobile at an excessive rate of speed, and the driver of a tram car was doing the same thing. They crashed together, and a lady was caught between the two vehicles and her leg was broken. The automobilist was sentenced to two months' imprisonment without the benefit of the first offense law, and the driver of the tramway sentenced to eight days' imprisonment with the benefit of this law, and they had to pay jointly \$3,000 damages.

The congestion of travel in London between the east and west costs the trade interest of London more than \$10,500,000, according to Sir J. Wolfe Barry. He would correct this by cutting a single mighty street 125 feet wide, 5½ miles long, from east to west, and this, with its subsidiary connections, would cost \$30,500,000. Should London continue to advance in the next twenty years as it has done in the past twenty years, something of this nature will have to be considered. The automobile will undoubtedly assist in straightening out the confusion.

## Purple Rainbow.

The Grand Duke Leopold Ferdinand gives an account, in the Meteorologische Zeitschrift, of his observation of a purple rainbow on the 8th of August last, near Przemysl. This locality has an altitude of 270 meters. During the night a heavy dew had fallen; near morning the temperature was 12° C. At the northeast appeared somber nimbus clouds, when at 3:45 A. M. the zenith assumed a strong reddish tint, this color increasing toward the northeast, and at 4 o'clock appeared a rainbow of exceptional width and of a pure dark purple; its summit was 35° above the horizon. After four minutes a second rainbow appeared, about 10° from the first, of an equal width, having a pale rose color. In the principal rainbow the purple color dominated, but the outer border was tinged with violet, and the inner edge was of a cherry red hue; its summit gradually ascended to 50°. At 4:16 the exterior secondary rainbow took an orange tint, then disappeared. The outer edge of the other became lilac, and the interior a pale cherry; by degrees, this latter color extended itself over the whole width of the rainbow, which finally assumed an orange tint.

## Science Notes.

We regret to note that Natural Science has been discontinued. It was recently published by Young J. Pentland, of Edinburgh, and was one of the best scientific periodicals in the world.

At the time of the recent meteoric shower it was stated that a meteorite partially wrecked a residence near Webster City, Iowa. On investigation it was found that the alleged fall of a meteorite did not occur.

M. Curie and Mme. Curie have forwarded a note to the Paris Academy of Sciences, in which they state that radio-active chloride of barium possesses the property of converting oxygen into ozone—which is proof that the radiation represents an expenditure of energy.

Bernard Quaritch, prince of booksellers, died recently in London. He was famous as a dealer in rare and valuable books. Many of his catalogues of scientific books were valuable from a bibliographical point of view. In the course of his career he handled large quantities of scientific books.

Prof. E. P. Allen calls the attention of The Chemical News to a case of corrosion of gold-plated weights which had been put away for the summer in a safe. It is thought that the corrosion was caused by mold, the gold-plate, perhaps, not being completely impervious, and the zinc being removed from the brass.

The American Society for the Promotion of Agricultural Science has approved the action of the Massachusetts Legislature in maintaining the Gypsy Moth Commission and carrying on the important work of exterminating the mischievous moth. Our readers will remember the interesting article we had on the subject a short time ago.

Some months ago we gave an account of the removal of the stomach of a lady who lived in Boston. The operation was a surgical success in every way, but the patient never recovered health, suffering intensely, and the suffering increased until the time of her death. Her prolonged life is evidence, however, that the stomach is not absolutely essential to human existence.

An investigation has been made by the Egyptian government into the recent fall of the columns of the Hypostyle Hall at Karnak. The commission appointed to make inquiry into the cause of the disaster concludes that it was mainly due to the removal of debris from the floor of the Temple, which had acted as a partial support to the columns, and that owing to its removal the water had some play around the bases of the columns. This indicates that this architectural monument is in a precarious state, and it is hoped that every effort will be made to prevent further damage.

The number of Leonid meteors observed at the University of Denver during the recent meteoric shower of November seems to have been larger than in most other places in the United States. We are informed by the Director of the Chamberlain Observatory, Prof. Herbert A. Howe, that a corps of volunteer observers did the counting on the morning of November 16, under the direction of Prof. Spencer. The number of Leonids counted was 204. There was, however, some duplication of the work because some of the observers simultaneously watched the same quarter of the sky. After making a deduction for this, 150 is the probable number of separate meteors counted. The work was considerably hindered at times by clouds, as was the case on the mornings of November 14, 15, 18, on which Prof. Howe saw 30 Leonids; the sky was totally overcast during the morning hours of November 17, so that no meteors were seen. Photographs were made on the morning of November 16, but the results were meager.

Dr. William A. Hammond, who was formerly Surgeon-General of the United States Army, died January 5, at his home in Washington. He received his commission as Assistant Surgeon in 1849, and served in the West for several years. He was afterward appointed Professor of Anatomy and Physiology in the Maryland University School of Medicine. When the Civil War began, he gave up his position and again entered the army. In April, 1862, he was offered the position of Surgeon-General of the Army with the rank of Brigadier-General, which he accepted. He introduced a number of radical changes, and charges were brought against him, and he was dismissed from the army in 1864, but in 1878 a bill was submitted to Congress authorizing the President to review the action of the court-martial, and in 1879 President Hayes restored Dr. Hammond to his place on the rolls of the army as Surgeon-General with the rank of Brigadier-General on the retired list. He had an extensive practice in New York, and was Professor of Diseases of the Mind and Nervous System in Bellevue Hospital Medical College and in the University of the State of New York. In 1882 he was one of the founders of the New York Post-Graduate Medical School. He was the author of a number of medical works, and was one of the originators of The New York Medical Journal; he also established The Quarterly Journal of Psychological Medicine and Medical Jurisprudence; he also devoted some attention to lighter literature.

## Engineering Notes.

In Buffalo, when a street car barn was being built recently, it was impossible to obtain steel within the required time, consequently old discarded street car rails were used instead.

The Metropolitan Street Railway Company will run open cars for passengers on the Madison and Fourth Avenue line all winter, which will enable those who smoke to be accommodated. The cars are combination cars, part of the car being closed and part open.

The Empire State Express now has a seating capacity of 257 passengers. The two day coaches have seats for 86 passengers. The smoking car contains 50 seats, and the parlor car 35 seats. The day cars, says The Railroad Gazette, have wash basins, soap and towels at either end, and the porter can be summoned with the aid of electric push-buttons.

Melinite was originally picric acid embedded in a collodion solution, and later on also fused picric acid. A mixture of fused picric acid and cresylic acid is now employed. Although picric acid was used as an explosive in the pulverulent state, mixed with saltpeter and other ingredients, yet the property of detonating with great violence when melted was first indicated by Dr. Herman Sprengel, and afterward patented by Eugene Turpin, of Paris.

The new Cunard steamer "Saxonia," which was launched on December 16, was the largest vessel ever built on the Clyde. The "Saxonia" and the sister ship were primarily designed for cargo carriers, the passenger requirements being subordinated to this aim. The name of the sister ship is "Invernia." The tonnage is close to 14,000, the length over all 600 feet, breadth 64 feet 3 inches, molded depth from upper deck 41 feet 6 inches. There are four principal decks.

Lyddite is simply picric acid brought into a dense state by fusion. The shells are coated inside with a special varnish, and the melted picric acid is cast into them. As this requires a strong detonator, or a very powerful primer, the government is said to have adopted a primer of picric powder, which consists of a mixture of two parts of ammonium picrate to three parts of saltpeter, manufactured in much the same way as ordinary granulated gunpowder. This is then set off by the ordinary service fuse, says The Engineer.

A firm in Dresden is offering a novel kind of fencing against drifting snow. It consists of a cocoanut matting, or rather netting, the meshes of which are about 1½ inches wide. The mats are usually 13 × 5 feet, says The Railway Gazette, and are lashed at the ends to posts which may be made of old ties, with truss ropes at the top and bottom. These fabrics offer very little resistance to the passage of light and air, but almost perfectly arrest snowflakes and do not decay when wet nor break when dry. In summer they may be rolled up and stowed away.

The Czar of Russia has three small daughters whose chief nourishment consists of milk, and as experts in the rearing of babies commend the use of milk of one cow, the little princesses take the cows with them on their travels. When they were taken on a recent visit to the Emperor of Germany, a palatial stable car was attached to the imperial train, and in this car were two stately Holstein cows which supplied milk fresh, warm and of a uniform quality as the children required it. The Railroad Gazette states that when the two august emperors fell on each others' necks at the stations at Potsdam, the awed spectators were somewhat startled to hear a lusty "moo" from the train which had just brought the Czar.

For some time past inventors have been looking for a device by which paper may be fed automatically to the printing press. M. Rymtownt-Rives, of Geneva, has, after six years of work, perfected a device which accomplishes this operation in a satisfactory manner, and has lately applied it with success to several large presses in that city. This automatic feeder may be applied to all kinds of printing presses, as well as to letter and folding machines. It is very simple in construction, and the changes necessary to accommodate the different sizes of paper may be easily and quickly made. The device consists of two distinct parts, the feeder proper and the distributor; the feeder has two movable arms carrying jaws at the ends which take up the sheet of paper on the upper table and bring it to the level of the inclined table below, where the arms of the press carry it to the form. The feeder includes also the mechanism operating the air-exhaust for the suckers which take up the first sheet and place it in the jaws. The second and most important part of the apparatus is that called the distributor; this is placed on the rear of the upper table containing the pile of paper, and its office is to separate the first leaf from the pile and prevent the suckers from drawing off more than one leaf at a time, no matter at what speed the machine operates. Upon the success of this device depends the working of the whole system. In fact, the improved apparatus has been found to work very satisfactorily at all speeds, and will take any thickness of paper.

## Electrical Notes.

A system of electric haulage has been installed on the Charleroi Canal in Belgium, the distance being about five miles.

The German courts have decided, on several occasions, that the theft of electrical energy was not punishable by law, as electric current or electrical energy could not be considered as a material object. A bill to remedy this state of affairs has now been laid before the German Federal Council.

Recent experiments with a view to connecting Brussels and London by telephone have been very successful, and it is probable that in a short time a regular line will be established. There is a telephone already working between Budapest, Vienna and Berlin, and in a short time it is expected that Berlin will have telephonic communication with Constantinople.

A new Mexican electric railway system is proposed to make connection with the railway system of Central Mexico. If it is built, it will extend for 409 miles, and the estimated cost is \$14,000,000. Of this sum, the Federal government will give \$6,000,000 and the states of Campeche and Tabasco will be asked for subsidies, as they will be the principal sections of the country served.

The first electric launch in Venice has been delivered. It accommodates about fifty passengers and is 56 feet long and 10 feet wide. Its average speed is 7 to 10 miles an hour, and it is called the "Alessandro Volta." While the introduction of any mechanical form of propulsion other than the gondola is to be regretted as far as Venice is concerned, still, if launches of this kind take the place of the small steamboats on the Grand Canal, it would be a great improvement.

An interesting question has arisen whether there can be a tariff on electricity. One concern on the Canadian side of Niagara Falls proposes to extend its lines to as many points as possible in the United States, selling its light and power to all the customers obtainable. This business would, of course, compete seriously with the power companies on the American side of the Falls, and the latter have been in communication with the United States Treasury Department relative to the matter. The Secretary of the Treasury has submitted the question to several leading collectors of customs in various parts of the country in order to obtain their opinions. If it is decided that the current generated is dutiable, it will be under the authority of the "drag-net clause" of our last tariff law, which makes all unenumerated manufactured articles dutiable at 20 per cent ad valorem. The case is a most interesting one, and is somewhat similar to the natural gas question, which came up five or six years ago. Natural gas was piped across the Niagara River from Canada. Duties were assessed on the gas, and the matter was finally taken to the Supreme Court of the United States, which held that no duty could be levied.

Following upon the opening of the Dortmund-Ems Canal, in Germany, an interesting series of tests is now being made to determine the practicability of electric traction for the canal boats of this system. The trials have been carried on in the neighborhood of Eberswalde, on the canal of Finow, under the direction of the government. The electrical installation has been furnished by Siemens & Halske. The results obtained have been on the whole satisfactory, and it is expected that before long this method of traction will be put in practical operation. The Lamb and Koettgen systems have been tested over distances of 300 and 1,000 meters respectively. The routes have been chosen so as to encounter all the different kinds of obstacles and difficulties which are to be found over the whole length of the canal, such as bridges, locks, sharp curves, etc. By the Lamb system, the traction is carried out by the aid of small locomotives which travel upon wire cables, 32 millimeters in diameter, fixed to strong posts along the bank about 4 or 5 meters apart. The current is not transmitted by these cables, but by a system of contacts contained in a special conduit. The locomotive will give 5 horse power and weighs about 900 kilogrammes. By this means the speed of traction reached 1 meter per second or about 4 kilometers per hour; this system works very well in practice, its only inconvenience being in the passage of sharp curves. The Koettgen system uses also a small locomotive, which runs on rails along the bank, these rails being arranged so that one of them carries 85 per cent of the weight, the other insuring stability. The current is taken by a contact wheel which runs along a conducting wire. The locomotive designed for this purpose has a weight of 2,000 kilogrammes, and the average speed is 4½ kilometers per hour; it is strong enough to haul three loaded boats or two loaded and two empty. The cost of traction amounts to about 0.1 pfennig per ton-kilometer, and if the traffic is carried on extensively, this figure will be still more reduced and will give an economy of transportation which has been valued approximately at 4,000,000 marks per year. This system has, besides, the advantage of being able to furnish light and power to all points in the region of the canal.