

## 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.