Communications.

Our Washington Correspondence.

To the Editor of the Scientific American:

Since my last, there have been several changes in the examining corps of the Patent Office. Dr. Jayne has been removed from the class of "metal working" to that of "agricultural products," to fill the position made vacant by the reduction of Mr. Connolly to first assistant, and Dr. Jayne's old place is filled by Mr. Church, who was formerly law clerk. Mr. Tasker, who had charge of the class of "woodworking," has resigned, and Mr. Bartlett has taken his position. This left the classes of "navigation" and "firearms" without a head; and Dr. Antisell, who many years since had charge of the class of "chemistry," but resigned during the war, has been appointed to fill this place. It is said that Dr. Antisell, in addition to the class of firearms, is to examine patent medicines, which is considered by some as rather a curious combination; but others are of opinion that the two classes will go very well together, as many of the medicines are thought to be as dangerous as the firearms, and as a parallel instance to this cite the sub-classes in charge of Dr. Wilkinson, who not only has "surgical instruments" to kill people with, but "coffins" to bury them.

In continuation of the system of surveys carried on by the government, the Wheeler expedition is about to take the field for 1877. It will be divided into three sections, one of which, to be known as the Colorado section, will rendezvous at Fort Lyon, Colorado, on the Arkansas river; a second one, the Utah section, at Ogden, Utah; and a third at Carson City, Nevada, to be called the California section. There will be six regularly organized parties prosecuting systematic surveys, the work of each one of which will finally appear in a complete atlas sheet. An additional base-measuring and triangulation party will operate in connection with the Utah section, and another special party will survey certain points in the Sierras, south of Lake Tahoe, a most interesting section in a topographical view. A distinct party will continue the survey of the Washoe mining district, while a special observer will prosecute underground inquiries relating to the disposition of bodies of ore; temperature at different levels; presence or absence of water and its temperature; the treatment of ores; and the ventilation of mines.

The official returns to the Bureau of Statistics show that, during the last month, the exports of fresh beef from the United States were 8,416,829 lbs., of a value of $821,431, and that 169,043 lbs. of mutton, valued at $17,648, were exported from New York alone. During the four months ending March 31, 1877, over 2,000,000 lbs. fresh beef and 339,002 lbs. of mutton produced in Canada were exported from Portland to England. That we may not lose this addition to our exports, nor be deprived of our own supply of this food, the State Department has addressed a communication to our consular officers in Europe calling for all the information that can be obtained in reference to the foot and mouth disease and rinderpest, and whether these diseases are likely to be communicated by the importation of dried and salted hides.

An official notification has been received by the State Department from the Chinese Government, that it has opened to American trade four more ports, namely, Tchang, Wuhu, Wenchow, and Pakhoi.

The same department has received information that the emigration from Hamburg, Bremen, and Stettin, during 1876, was 50,577, all of which, except about 5,000, sailed for this country. This, however, is a falling off from last year of about 6,000, which is attributed to the hard times.

The bids for supplying postal cards for the next four years have just been opened, There were twenty bidders, and the bids ranged from $69\frac{56}{100}$ cents to $\$1.15\frac{3}{4}$ for single tinted cards, and from $73\frac{43}{100}$ cents to $1.25 per thousand for double tints—the lowest bidder on either class being the American Phototype Company of your city. The price paid the present contractors is $\$1.39\frac{7}{8}$ per thousand, and their bid for the next four years was 75 cents. It is estimated that over one billion cards will be required during the ensuing term, which will take 3,125 tons of cardboard, and if spread out would cover 250 acres of ground. The difference between the prices on the two contracts on the whole number of cards required will amount to $701,900.

Washington, D. C. OCCASIONAL.

Compressed Air vs. Steam.

To the Editor of the Scientific American:

In a recent number of the *Iron Age*, it is stated that air compressors, now at work in some of our Western mines, yield ninety per cent of the compressing power. In other words, a one hundred horse power steam engine compresses sufficient air to run a ninety horse power air engine. If this is so, it would seem that a system of locomotives might be worked quite as cheaply with compressed air as with steam; for the reason that a stationary engine has at least from ten to twenty per cent the advantage of a locomotive in the consumption of fuel, owing to the great radiation to which a locomotive is exposed. The air locomotive has also another important economic advantage in its less costly and more durable air tank, as compared with a locomotive boiler.

A plain cylinder of boiler plate with hemispherical ends is a very simple affair, requiring no staying, and containing about three times the capacity of a locomotive boiler of equal weight and strength. A single charge of compressed air in such a tank, at a pressure of 250 to 300 lbs. to a square inch, would probably run a car load of passengers several miles on a level line. To present the case in a practical way, let the Greenwich Street Elevated Railway Company, for instance, locate a one hundred horse power air compressor and an ample reservoir at a central position between the termini of their line. The reservoir may consist of a number of cylindrical tanks with hemispherical ends, 4 feet in diameter and 40 to 50 feet long, made of the best boiler plate, so as to be perfectly safe and tight at a pressure of 300 lbs. to the square inch. Let the tanks be so placed that every part of their external surface may be easily got at for an occasional coat of paint to prevent corrosion. The expense for current repairs and for fuel for such an apparatus would be very light, it would seem, as compared with that of their present system of locomotive boilers. If the length of their line or other exigency should require the locomotive tanks to be charged at other than the central point, a three inch pipe may be laid from the central reservoir to any other point of the line desired for that purpose. The valve gear of the locomotives should be so arranged that the cylinders may be used as compressors when making stops and when going down grade.

I can see no reason why the air locomotive, in connection with the elevated railway, shall not eventually give us the most desirable and perfect system of city transit possible. No other system embraces so many excellent features as this, especially for passenger transit, namely, pure air and sunlight and a fine outlook, freedom from mud and snow, and non-interference with other travel. The reader will find an interesting and finely illustrated article upon air locomotion in the SCIENTIFIC AMERICAN SUPPLEMENT of January 1, 1876.

Worcester, Mass. F. G. WOODWARD.

The Flight of Birds.

To the Editor of the Scientific American:

In regard to the flight of birds, I think that there is no necessity to resort to such theories as the figure of 8 motion to understand how a bird flies when it beats the air with its wings. I think that the formation of the feathers, and their imbrication in the wing, ought at once explain that kind of flight. When the bird makes the down stroke, the wing offers a solid resistance to the air, and the motion imparted to the body of the bird must be upward. The wing must then be raised to come into position for another stroke. In so doing, each feather lets the wind pass through in an oblique manner, which causes them to act as sails on a windmill or on a ship, thereby propelling the bird forward. The bird instinctively knows how to direct these strokes, as it wishes to ascend, descend, or move straight forward. The effect of the down stroke can be seen when a large bird such as a turkey buzzard begins to fly in a place where there is not room for rapid headway. Each down stroke is more violent than the up one, and the body is jerked up each time.

A flying machine might be made so that the wings would have a sufficient resistance to the air to keep it up, and the propelling part could be arranged independently. But there is another mode of flight that has puzzled the minds of men. It is a remarkable thing that man has seen beyond the Milky Way, and is now studying the constituents of the sun, yet he cannot understand the sailing of birds. I have seen many attempts, but they all fall short of the mark. I have seen buzzards with outstretched wings rise in a spiral course, when it was so calm that a leaf on a tree was not moved. I have seen the frigate bird wheel in graceful curves upward when the sea was as smooth as a mirror. I have seen the buzzard sail nearly in the eye of a strong wind without any other motion being perceptible than a little balancing. I have looked down hundreds of feet on them as they sailed beneath me, and never could detect any motion of the wings. The theory of inclined planes will not explain it. I have also noticed large butterflies float about in a most heaven-like enjoyment, in some cozy opening among trees, on a fine summer evening, when there was not a breath of air, without once moving their wings, as if they were some disembodied spirits that had neither attraction or gravitation, but only will. I have seen a motion very similar to the sailing of birds in fishes. I saw a number of porpoises sailing immediately in front of the prow of the steamer. They were packed quite close together, and moved exactly as fast as the steamer. As it was necessary that they should breathe occasionally, they were continually rolling over each other to come to the surface. Sometimes half the fish would be out of the water, yet the uniform motion was kept up, and no one on board could detect any motions of fins or body to warrant such speed. There are other modes of flight such as by bats and insects, the dragon fly as an instance; but the sailing of birds is a most interesting study for philosophers, and it will be safe to say that man will never be able to put it in practice. But the knowledge may come in play in explaining some things yet in embryo.

Hagerstown, Md. JOHN H. HEYSER.

Reclamation of the Sahara.

To the Editor of the Scientific American:

Your article, in the SCIENTIFIC AMERICAN of May 12, entitled "Lands below the Ocean Level," presents a statistical discussion of present and future results of converting the great Sahara Desert into an inland sea, by connecting it with the ocean. The conclusion that the expiration of 100 years would be sufficient to convert the great desert of sand into a desert of salt is doubtless correct, on the supposition of a communication having a water discharge equal 525 times that of the German Rhine. But the construction of such a channel is practically impossible. A channel conveying, say, ten times the volume of the Rhine might, however, be possible; and from it entirely different results would probably ensue. The quantity of water delivered by such a channel would cover $\frac{10}{525}$ of the area of the desert, or about 76,000 square miles. Almost immediately upon the admission of water to the arid plain climatic changes would ensue, reducing the temperature and the rate of evaporation. As the formation of the new sea progressed, its surface and shores would become the recipients of the gentle shower and the driving storm. These causes would continue to operate with increasing force as the sea augmented in size. If we suppose evaporation to be reduced one fourth by the new conditions, and that another fourth is returned by rainfall, it will follow that a body of water would ultimately result, having an area of 152,000 square miles—that is, the area will have been doubled from these two causes—an area one half larger than that of the Caspian Sea. The presence of such an enormous body of water in the Great Desert would, we may well conceive, establish a tributary river system of its own and maintain an independent meteorological area of vast extent. Taking 15 feet as the annual evaporation (since we have supposed it to be diminished one fourth), and allowing 2 feet rainfall yearly as sufficient to insure productiveness of the surrounding desert, we shall have an area $7\frac{1}{2}$ times that of this new sea, or 1,160,000 square miles of reclaimed territory, to say nothing of the incidental benefits accruing to Morocco, Algeria, and Tripoli, and possibly to Egypt and Nubia also.

As to the stability of the new condition of things, no present fear need be entertained. For, since 525 times the flow of the Rhine would require 100 years in which to fill the great Sahara with a deposit of salt, the proposed 10-Rhine channel would occupy 5,250 years in accomplishing the same end. Indeed, it is doubtful if a much longer period would accomplish it. For it must not be forgotten that a sea *fauna* and *flora* would be developed, capable of converting a very large amount of salt into organic compounds, thereby eliminating it. Moreover, the consumption by humanity and the surrounding animal life would effect a not insignificant postponement of the supposed final result.

Platte City, Mo. R. T. ELLIFRIT.

A Fire Escape Invention Wanted.

To the Editor of the Scientific American:

Cannot some ingenious Yankee invent a wire bed bottom, that will form a spring bottom when on the bed, and which can, when necessary, be unfolded to form a ladder of any required length, say for one, two, three, or four stories of a house? It would be of little use unless it was so simple as to require no skill to operate it; and it should have one end attached to the bedstead, so that the occupant could throw off the bed clothes, throw the wire ladder out of the window, and go to the ground.

Beaver Falls, Pa. J. E. EMERSON.

Sheep Farming in California.

It is estimated that from one half to two thirds of the sheep in the State have perished from starvation. The loss of cattle is not so large, as they were taken to the mountains in time. Dr. Swain, of Watsonville, recently started for the mountains from Fresno, with over three thousand sheep, and the lifeless carcasses of over twenty-five hundred of them now mark the route taken. The doctor says that unclaimed dead and dying sheep cover the plains, and hundreds of sheep and lambs fall into line behind the wagon of the traveler, and follow, in the hope of getting a morsel of hay. One man from the San Joaquin Valley lost every sheep he had—eleven thousand—during a storm, and went home a penniless man. Another, an Italian, thought he could save the cost of ferrying his sheep across the Tuolumne River by swimming them, and eight hundred were drowned in the attempt. Another man east of Visalia, despairing of ever getting his sheep to where there was feed, turned twelve thousand out to starve. If he undertook to drive them to the mountains many of them must die of starvation before reaching there, because there is no feed on the way; and then, when the mountains are reached, all the good feed is already taken up by men who hold possession, shot gun in hand, and who are desperate enough to fight to the death. There will probably be a good many cases of bloodshed and death in the mountains this summer, and many stock men will mysteriously disappear to return no more.—*Watsonville (Cal.) Transcript.*

Patent Office Publications in England.

The English patent office authorities have determined to discontinue the publication of the abridgments of specifications, in many senses, the *English Mechanic* thinks, the most valuable productions of the office. Having introduced a "cheap and nasty" style of printing specifications and drawings, they are anxious to save a few more pounds to add to their clear income of $500,000 per year. To remedy the difficulty pointed out by the judges, namely, the impossibility of deciphering the drawings now produced, full sized copies will now be supplied.

Laying Water Pipes.

When water pipes are laid at an inclination either above or below the horizon, a correction will have to be made in estimating the supply, by adding or deducting $\frac{1}{100}$ of an inch to or from the initial pressure for every foot of fall or rise in the length of the pipe.—*Molesworth.*