Correspondence.

Phosphorescent Cranes.

To the Editor of the Scientific American:

In a late issue Mr. Worsall refers to the phosphorescence of cranes, etc. The reason that it is not referred to in scientific books is that hitherto, as far as my knowledge goes, very few people have observed it, and Mr. W.'s testimony is extremely valuable and interesting. I have never doubted that the powder down patches of some of these birds were luminous at certain times.

Twenty years ago an old hunter and experienced observer told me that he had observed it on the Florida Reef, and I made a sketch from his description, and it will be found in an article of mine in *St. Nicholas* of May, 1881. Since then I have been unable to find a single naturalist or collector who has ever observed it, though several had heard of it. Mr. Hornaday has probably had as much experience as a collector and field worker as any one in this country, yet he wrote me some time ago that he had never heard of it. Mr. Charles Harris, an ornithologist of Pasadena, tells me that in entering a heronry at night, in Maine, he noticed a number of lights there, which disappeared with the birds.

C. F. HOLDER.

Pasadena, Cal., March 3, 1887.

Balance Pivots.

It is not too much to say that 40 per cent of watches that are left for repairs have the balance pivots injured; at least, there is quite that proportion of them that would be improved by having these pivots touched up and burnished. A pair of brass runners should be fitted to the turns, and kept for this purpose only; the right hand runner having a series of small holes drilled in its one end, on face, to fit various sized pivots as near the circumference as may be, the runner being turned away at the back of these holes sufficiently to give room for operating on the ends of the pivots; on the other end of this runner a series of facets is made, with nicks in the middle of them, as beds for the different sized pivots. On the left hand runner an eccentric point is made, and a center made in the point to correspond with the pivot beds in the right hand runner. A very small flat burnisher, with one of the corners rounded off, is easily made, and should be kept for burnishing pivots.

If the injured pivot is put in the bed in the turns, and the burnisher applied to the straight part of the pivot, then the runner reversed and the end of the pivot rounded, it will be found that a burr has been thrown up on the corner, which must be removed and the operation of burnishing the side and end of the pivot gone through again. Nothing but a burnisher should be used in repairing pivots that are damaged in this way, as if a file or slip of oilstone is used, you are likely to spoil the pivot; but the burnisher should be kept sharp and constantly rubbed on the emery board, which is the usual thing to rub a burnisher on; but a lead block with a planed surface is much better, as it keeps the burnisher flatter and smoother, and a burnisher rubbed on the lead cuts as fast as one with a coarser surface.—*W., J., and S.*

Inhabitants of Other Worlds.

The *Popular Science News* presents in a late issue an article bearing on this subject, in which it sets forth one reason why such bodies as the moon, Jupiter, and Saturn could not be inhabited by beings of the same physical constitution as mankind, even supposing that other conditions governing existence there should be favorable, which is not the case. The argument in question depends on the action of gravitation at the surface of these several bodies. Thus, at the moon's surface, the force of attraction being very much less than at the earth's surface, a being constituted like man, and endowed with the same muscular energy, could leap to astonishing distances—clearing, for example, a three-story brick house with the same ease that he would clear a post and rail fence on the earth; the elephant would become as light footed as the deer; a stone thrown from the hand of a thoughtless boy might fall in an adjoining county before accomplishing its mission of destruction; armies could engage each other in battle at great distances apart; and all kinds of labor would be greatly lightened by reason of the diminished weight of tools and materials. While this state of things might not render human life, endowed as we have it on earth, impossible on the moon, the opposite state of things which would prevail on Jupiter and Saturn would certainly render life, in reality, a burden. The masses of Jupiter and Saturn, being so much greater than that of the earth, the correspondingly greater attractions which they would exert would so impede locomotion that unless endowed with enormously greater muscular power than he is gifted with on the earth, man would only be able to crawl along as though his feet were weighted with lead, while the larger animals, in all probability, would be crushed by their own weight.

The Use of Steam.

For years economy in fuel has been the subject of much study, and has caused a vast amount of discussion, and has been primarily responsible for many types of steam generators and attachments, patent settings, and cheap fuels, all possessed of varying degrees of merit, or otherwise, as the case might be. This question seems to the writer* to have been studied by engineers and manufacturers to the exclusion of a proper consideration of the economical use of the steam after it is generated, with the single exception, perhaps, of its use in engines for power purposes, which branch has received much attention, in spite of which, any decided improvement in their performance does not appear to have been recently made, and the engine remains a very wasteful machine, although, if we glance at a few of the legion of advertisements of as many makers, and read the claims therein set forth, it would appear that little or nothing remained to be accomplished in this direction. But we hear so much said of the amount of fuel used and wasted, and the great cost of furnishing steam in our manufacturing establishments, it will be well to consider where it goes in some of the more ordinary cases, and call attention to the amount absolutely necessary to do certain kinds of work. We shall consider but a few of the many establishments requiring steam in the production of their goods, and first we will consider its use in a paper mill, not for the whole plant, but for one or two principal departments only, and for illustration we will assume that the mill produces five tons of finished paper daily.

The felted paper, as it passes from the squeezing rolls to the drying cylinders, carries from 60 to 70 per cent of water by weight; probably the average is not far from 65 per cent. It will therefore be seen that we have to evaporate 6,500 pounds of water per day, and that, too, from a low temperature, to do the drying alone. To this must be added the loss due to condensation resulting from the loss of heat from the exposed surfaces of the drying machine and its connections, which will be from one-third to one-half of a pound of water per hour for each square foot of exposed surface, according to circumstances.

The rotary bleacher will, if of the usual size, require about three thousand pounds of steam to bring it to the boiling point, and the radiation from it will result in the condensation of about 180 pounds of steam per hour.

The heating of the mill, the pipes in the drying lofts, and all exposed pipes will require about one-half pound of steam per square foot of surface per hour to make good the loss by condensation.

In bleacheries for cotton cloths and yarns, one pound of water evaporated in the generators will bring to a boiling point five pounds in the bleach, to which must be added the loss by radiation of heat. Dye-becks, scouring and washing machines, etc., will require steam in the same proportion. Cotton yarns, cotton in the bat, stockinet goods, etc., as they come from the hydro-extractors, carry about 38 per cent of moisture, in fact, several weighings by the writer of goods from the extractor and from the drying rooms showed a variation of less than 1 per cent from the above.

Light ducks, drills, and jeans were found to contain about 50 per cent of moisture by weight as they passed to the drying cylinders, and by carefully collecting and weighing the water of condensation from the driers, it was found to agree very closely with the amount which estimates showed would be required to evaporate the quantity of moisture carried by the goods, as stated above, after making due allowance for the loss by radiation of heat from the exposed surfaces of the drying machines. It should be mentioned, however, that the quantity collected has in every case exceeded, though but slightly, the estimated amount required.

A tentering machine operated in a closed room, with the temperature varying from 132 to 140 degrees Fahr., condensed slightly more than one-half pound of steam to each square foot of coil per hour, the steam pressure varying from 35 to 40 pounds per square inch; had the pressure been higher, the condensation would have been greater, and more work could have been done.

Of woolen yarns the writer has not had so good an opportunity to ascertain the quantity of water remaining to be evaporated, but from limited trials made would expect it to range from 50 to 60 per cent.

We have touched, and but lightly, some of the processes requiring a large quantity of steam, and would add that this quantity is absolutely necessary under the most favorable conditions. One fact should never be lost sight of by the manufacturer, viz., whenever machinery is put in that requires steam in its operation, the sharp competition among the different makers of such machinery leads to their estimating and claiming, as features of such machines, the consumption of the minimum quantity of steam to do a certain amount of work, while similar causes tend in the opposite direction in the rating of the capacity of steam generators, that is, they are usually rated at their maximum capacity. This not infrequently leads to putting down insufficient boiler power, thus causing disappointment and dissatisfaction.

From the foregoing, it will be seen the amount of steam necessary to do certain kinds of work is very considerable, and no arrangement can be devised that will in the least degree render the amount any smaller. In addition to the amount actually required to do the work, there will always be a certain amount lost by condensation in pipes, etc., and this quantity may easily become quite a large amount, as the following case will illustrate. A boiler to be used for heating purposes only was put in, and its capacity was sufficient to just supply the radiators and nothing more, under the most favorable conditions. The system as arranged had a very large quantity of piping, its only fault, as otherwise the arrangement was good. When started, the whole system seemed a failure, and gave great dissatisfaction. Investigation disclosed the fact that the supply and return pipes alone had radiating or cooling surface enough to condense all the steam the boilers could economically generate.

So we find steam carried long distances and in many directions, in our large manufacturing establishments, and the heat lost in this manner sometimes bears no inconsiderable proportion to the whole amount used. It should also be borne in mind that the higher the pressure and temperature, the greater will be the proportion of loss from this source.

*F. S. A. in *The Locomotive*, published by the Hartford Steam Boiler Inspection and Insurance Company.

Danger Lurking in the Chimney Top.

"Observer," in the *St. Louis Miller*, says: A long experience in burning wood fuel in both heating and cooking stoves has brought out a danger point in this combustion that may throw light on some of the unexplained fires that from time to time occur in both city and country, and especially in the country. Being much annoyed by rain running down inside the flue, I procured a sheet iron cap for one flue and a fire clay T cap for the other. After that time I was every now and then troubled with the flues being on fire, and in several instances the roof took fire outside. After a long experience of this kind the iron cap was removed, and no more fires have been in that flue or on the roof of that building.

This led to a close watch over the other building, which had the stove pipe enter into a fire clay pipe flue of six feet, ending in a T top on the outside. The fire clay flue rises through an attic. The frequency of fires led to very careful examination into all the associated conditions. Thus I find that the colder the weather is, there is not only increased combustion, but increased condensation of the elements of the wood carried up in the smoke, and, striking against the top of the cap, is retarded in its emission, and water and a tarry substance containing an inflammable oil is thrown back down the flue, and gathers on the top and around the openings of the top, often dropping on the roof. This substance is easily ignited, and the flue, the top, and the matter on the roof all burn with great force, and is a source of great and constant danger.

Experiments show that angles, bends, or numerous pipes entering the same flue, by retarding or impeding the direct draught, tends to this deposit by favoring condensation. The process is similar in action to the retort. It is the production of an empyreumatic oil by the destructive distillation of wood.

I have tried burning zinc, sulphur, salts, etc., but all fail; direct draught, no obstruction by caps, and frequent troublesome cleanings are the only preventives of the danger. The soot, of itself, has little or no inflammability. Attention to this subject may be of value both to owners and insurance companies, and scientists may find a way by which to utilize the inflammable products which enter so largely into all our domestic enjoyments.

This whole subject of domestic combustion is worthy of close attention, as being associated with interests and dangers of very great importance.

A Serious Railway Accident.

On the morning of the 14 inst., while a train of nine passenger cars on the Boston and Providence Railway was passing over an iron Howe truss bridge that spanned south at roadway near Boston, the bridge suddenly gave way, after the engine and three cars had passed over; the remaining portion of the train, consisting of six cars, was precipitated into the street 25 feet below. All the cars were crowded with passengers going in to Boston to their accustomed avocations. What added to the horror of the accident was that the cars plunged down one upon the other, so that the forward cars that fell were then again crushed by the weight of others. It is estimated that about forty persons lost their lives, while about one hundred were wounded. The exact cause of the breaking down of the bridge has not yet been ascertained, but is believed to be due to its weak and rickety condition and lack of thorough examinations. Each of the cars was provided with a safety stove, and the value of the invention was effectively proved, as the stoves were found intact, with their doors locked. This shows that car stoves may be made safe, if the railway managers choose to make them so.