Correspondence.

Fungi on Glass.

To the Editor of the Scientific American:

In the last SCIENTIFIC AMERICAN I saw an account of "Household Fungi," said to be found on glass, exhibited at the Microscopical Club of Buffalo. As I have made glass a subject of study for about twenty years, and entered a glass store as a boy forty years ago, I am desirous to know more about the glass referred to. I never saw or heard of any "fungus" on glass, but I have often seen what we call rust or stain on the surface, and that is, I think, what was observed. It is an efflorescence upon the surface occasioned by an excess of soda or potash in the composition of the glass. It can be removed from the surface by the skillful use of hydrofluoric acid.

The reason why similar appearances were found on glass in other places is that it was probably of the same kind, having an excess of uncombined alkali, which, having an affinity for moisture, effloresces and forms a coating, which can only be removed by acid. If it were indeed a "fungus," I think it could be easily removed by soap and water. That it could not be thus removed proves conclusively to me that it was the ordinary rust or stain, which so frequently troubles the glassmakers. If it be rust, it is no new phenomenon, but one which is noticed on all the old Greek and Roman glass exhumed from the ruins of old cities, whose iridescence charms us in the museums of Europe and America; and this same rust has often been removed from the windows on which it has appeared in public and private buildings, by workmen in my own employ, by the skillful use of acid. This stain, in some cases, presents such peculiar shapes and colors, that it has given rise to all of the ridiculous stories of portraits of deceased friends impressed upon window panes by the action of lightning.

Boston, May 18, 1880. THOMAS GAFFIELD.

[Prof. J. W. Ward, to whom Mr. Gaffield lately wrote, substantially as above, informs us that, in view of Mr. G.'s suggestions, he has re-examined his patches of fungi, and is satisfied of their vegetable and superficial nature. But the statement in regard to their removal he thinks is a little too strong. They do in fact defy the action of soap and water; but rubbing with a pine stick and subsequent polishing with a cloth will, says Prof. Ward, remove them completely and leave no trace behind. Prof. W thinks that the rust mentioned by Mr. Gaffield is not very often seen except by close observers like himself.—EDS. SCI. AMER.]

Fungi on Glass.

To the Editor of the Scientific American:

In the paragraph on page 320 of your journal for May 22, 1880, making mention of my note on a curious fungus discovered on some picture-covering glasses hanging on the wall of my house, there is a little inaccuracy, which, of course, is not chargeable to you, but to the reporter who collected the item for his journal. I exhibited the fungus, which covers several similar glasses in my sitting room, as a curious production; and after making some remarks on its peculiar characters, said further that I had noticed another but *different looking* fungoid growth occurring in somewhat similar spots scattered over the glass in the windows of the Grosvenor Library. Prof. Kellicott stated he had seen what *might be* the same thing on the windows of the Central School and City Hall.

My suggestion in relation to *these* growths, that is, such as were discovered on the windows of these public places, was that they might be due to human exhalations or confined breath; that those found on the glasses in my own house, which were *quite different* in form, had such an origin, I particularly stated, I did not feel satisfied, though it might be possible. I am not prepared to name either of these fungoids. That found on the windows of the library is small, yellowish-gray in color, densely arachnoid, with a distinct annular boundary, and variable in size. The one in the dwelling room belongs to the group of white rusts, *Perisporiacei*, something like an *Erysiphe*, but still more regularly defined, and without a nodular center. It is radial, dichotomously branching, white, circular in outline, the dichotomous terminations of the branchlets free, the whole flatly adherent to the glass, the surface of which it almost entirely covers with its thread-like disks.

JAS. W. WARD.

Buffalo, May, 1880.

Seeing by Electricity.

To the Editor of the Scientific American:

Your article on "Seeing by Electricity" contained in the SCIENTIFIC of June 5, page 355, will prove of interest to many. Early in the fall of 1877, the principles and even the apparatus for rendering visible objects at a distance through a single telegraphic wire were described at No. 21 Cortlandt Street, in this city, to James G. Smith, Esq., formerly superintendent of the Atlantic and Pacific Telegraph Company, and now of the Continental Telegraph Company, I believe, and to Messrs. Shaw & Baldwin, telegraph constructors, also, I believe, now connected with the Continental. At that time I was engaged in perfecting an autographic telegraph by which maps and pictures were daily transmitted by telegraph over a single wire.

The recent announcements of this discovery in three different directions, each undoubtedly independent of my own experiments, show how the same idea often occurs in separate minds. There is no likelihood of any plan of this kind ever being reduced to practice, for some of the difficulties in the way of all of the plans are insuperable, as will be apparent from the following reasons:

1. The action of light upon selenium in changing its electric conductivity is slow; although new discoveries may remedy this feature.

2. To convey with any accuracy an image, one even so small as to be projected upon a square inch of surface (I am speaking now of the apparatus you describe), would necessitate that this surface should be composed of at least 10,000 insulated selenium points, connected with as many insulated wires leading to the receiving instrument; for the variation of the one-hundredth of an inch either way will "throw a line out of joint."

3. The most delicate apparatus would not indicate a change in resistance by the projection of light upon merely a selenium point.

4. Isochronism is unattainable, as required. The method I proposed involved the isochronous movement of the separate instruments. The transmitter consisted of a coil of fine selenium wire in a darkened case, having a diameter of say three inches. Light from the image to be transmitted was to be let into the chamber and upon the selenium coil by a fine tube which, starting at the periphery of the circle, would draw concentric imaginary spiral lines until reaching the center of the circle. Thus light emitted or reflected from the image to be transmitted would affect the selenium just in proportion to the brightness of the image at the different points within the compass of the circle traversed by the imaginary lines drawn by the opening in the tube. The speed of motion of the tube was to be such that in describing all the spiral lines from the periphery to the center of the circle, the impression made upon the retina while at the periphery of the circle would not have ceased until the light ray should have reached the center of the circle.

The receiver consisted of a darkened tube, having an inside diameter of three inches (corresponding to the transmitting circle), with its sides and bottom absolutely black. In this tube, describing imaginary lines just as the tube in the transmitter, was a blackened index carrying two fine insulated platinum points very close together connected with the secondary wire of a peculiar induction coil, the primary wire of which constituted a part of the main wire leading to the transmitter.

The transmitting ray of light and the invisible index in the darkened receiving tube were to start at the periphery and describe their spiral motions in exact unison until the center should be reached, and the speed being sufficiently great it is obvious that as the first spark between the receiving platinum points would not have ceased to affect the retina until the last spark, with the index at center, would have been produced, an exact image of the object before the transmitter would be reproduced before the eye of the observer placed at the darkened chamber of the receiver.

But the trouble is to make the selenium sufficiently active, *and to get the isochronous motion.* Perhaps some of your readers may like to try their hands at rapid synchronism.

W. E. SAWYER.

New York, June, 1880.

A NEW MOTOR.

One of the great wants of the day is a motor for small machinery, which shall avoid the danger and inconvenience of steam. This is accomplished in the Tom Thumb caloric engine, recently patented, which makes use of the expansive force of heated air alone. Its success is based on employing

THE TOM THUMB CALORIC ENGINE.

a comparatively low temperature—250° to 300° Fah.—producing a pressure of four to five pounds per square inch, and operating on a broad diaphragm piston of relatively short stroke. The piston is formed of two circular metallic disks, having between them a flexible diaphragm composed of a layer of vulcanized gum elastic sheet, and over this externally a layer of canvas, which protects the gum and prevents it from yielding to pressure. A clamp ring attaches this diaphragm air-tight to the rim of a dish-shaped vessel, so as to allow of a motion in the piston to the extent of about one-third its diameter. This is the working cylinder, from which, it may be observed, the boring and fitting, as well as friction incident to the ordinary arrangement, are quite eliminated. The piston box forms the upper member of the machine, the connection of piston and crank being apparent in the engine. The central part, the heater, is a tight metallic box, the interior heating surface of which is greatly increased by numerous thin plates or ribs cast in connection with the bottom and rising almost to the top nearly the whole length. The heat being applied to the bottom of the box, the lower edges of these ribs are virtually in the fire, and thus the whole are readily kept at a suitable temperature.

At the bottom is another piston box similar to the first, but larger, and having its piston below, with a valve in it opening inwards. This is the air pump, and it is connected with one end of the heater by a pipe which has an automatic valve at the lower end, opening upwards. As this piston descends it fills the box with air, which in ascending is forced into the heater, and the valve in the pipe prevents its return. The other end of the heater is connected with the upper piston box or motor by a pipe always open, the two thus forming one chamber.

The operation of the machine is thus: The heater being filled with expanding air, the motor piston is forced upward, and just before it reaches the highest point a tappet on one of the cross head guides raises a lever, pivoted on the outer frame, which lever in rising forces open a valve in the bottom of the motor box, opening a communication with the outer air, and consequently the pressure subsides, allowing the piston to descend. Soon after the main crank passes the top center two long cranks on the ends of the shaft, connected with the crosshead of the lower piston by slotted rods, suddenly collapse the air pump, blowing out the hot air from the heater and motor box through the now open valve in the bottom of the latter, and supplying its place with fresh cold air. The motor piston now descending presses and closes the latter valve, and the fresh air is confined between it and the valve below the heater, to be at once expanded for another stroke. The action of the air pump not being against any pressure, little power is consumed in it. Like other caloric engines, it is single acting, and the pulley serves also for a flywheel. The internal capacities of the air pump and heater are equal, and about three times that of the motor vessel. This is important in order to obtain sufficient pressure at a temperature so low as not to injure the motor diaphragm—the gum being vulcanized to bear about 300° Fah. The simplicity and chapness of construction of this machine will recommend it for a great variety of purposes. An engine suitable to propel a sewing machine is about twenty-five inches high by thirteen wide, and heated by an oil or gas stove. An engine forty-five inches high is a quarter horse power. while the full horse power is six feet high by three feet wide.

For further information address J. Jenkins, No. 3 South Tenth street, Philadelphia, Pa.

MISCELLANEOUS INVENTIONS.

Mr. Francis Law, Sr., of East Orange (Bloomfield P. O), N. J., has patented an improved hat-flanging machine, so constructed that the sand weights can be conveniently raised and lowered upon the flanges to press the brims of hats. The invention consists in constructing a hat-flanging machine of a frame having table and bench, a suspended sand weight, a carriage and track for carrying the sand weight, uprights, and a treadle for raising and lowering the sand weight.

An improved breech-loading firearm has been patented by Mr. George H. Fay, of Morrison, Ill. This invention relates to improvements in firearms composed of a number of fixed barrels, and to the mode of firing the arm; and the object of the invention is to give a wider range to the arm, and thus increase its effectiveness; also to arrange the firing devices so that all of the barrels may be fired simultaneously, or singly.

Mr. James O Hands, of Louisville, Ky., has patented a novel device for automatically delivering coins for the purpose of facilitating the ready making of change. The invention consists of a box or case containing a number of receptacles for holding coins of different sizes, of automatic devices for delivering the coins and sounding an alarm as each coin is delivered, or as the drawer is opened, and of novel devices for locking the drawer and the delivery slides.

Mr. Samuel M. Kohr, of Omaha, Neb., has patented a new butter package for transportation and handling butter conveniently. The invention consists of a pail containing a series of crates, formed of a number of cups for receiving the rolls of butter, mounted above each other upon a central rod in the pail.

Mr. Peter W. Nelson, of Moline, Ill., has patented a device of especial convenience to shopkeepers, whereby barrels of groceries or other articles may be supported and readily swung in and out under the shop counter. The invention consists of a vertical bar having at each end a laterally extending hook or clasp, the upper hook or clasp being vertically adjustable, said bar being pivoted above in the under side of the counter, near its edge, and below in the floor, so that it can be turned outward to receive a barrel between its hooks or clasps and be swung around to carry the barrel under the counter.