

A Partial Solution of the Problem of Tele-Vision.

BY OUR BERLIN CORRESPONDENT.

The problem of tele-vision has long been a favorite one with enterprising inventors. The many tele-photographic apparatus which have been made known in the course of the last few years are the outcome of their endeavors. But the transmission of photographs, drawings, and handwriting over a telegraph wire is incomparably more easy than the instantaneous rendering of the moving objects situated at the transmitting station.

It is true a solution of the problem could be attempted on the very principle underlying the construction of these tele-photographic apparatus. The various sections of a picture would be produced—not successively, as in the case of tele-photography, but simultaneously, as well as instantaneously, without any lag, and would become visible immediately without any photographic process. There are two difficulties in the way of a practical realization of this idea, viz., (1) the extraordinary costliness of such an outfit; (2) the sluggishness or inertia of the vital organ of most systems, viz., the photo-electric selenium cell.

Mr. Ernest Ruhmer, of Berlin, well known for his inventions in the field of wireless telephony and telegraphy, has succeeded in perfecting what is probably the first demonstration apparatus which may be said actually to solve the problem. The writer has had an opportunity of inspecting this curious machine immediately before its being sent to Brussels, in order there to be demonstrated before the promoters of the Universal Exhibition planned for next year. In fact, a complete and definite tele-vision apparatus, costing the trifling sum of one and a quarter million dollars, is to be the *clou* of this exposition. The demonstration apparatus has been produced at a cost of \$1,250, and by reason of its more elementary construction, lends itself only to the reproduction of the pattern, consisting of squares arranged in different combinations.

The pattern is thrown on a screen hung on a wall, which screen is a square divided into 25 square sections. Behind each of these sections is arranged a highly sensitive selenium cell in which, by a novel process, inertia has been eliminated so far as possible. It thus responds instantaneously to any variation in lighting it is exposed to.

At the receiving station is arranged a similar screen, divided into the same number of sections, each of which communicates with the corresponding section on the transmitting screen. While the actual system used in transmission is kept secret, this much may be stated, that a highly sensitive mirror galvanometer reconverts the fluctuations of current produced by fluctuations in luminous intensity on the transmitting screen, into corresponding light-variations. An accumulator battery supplies current to the tele-vision circuits.

As soon as a perforated pattern is inserted in the projector, a telegraphic reproduction of the picture appears at the very moment it is thrown on the transmitting screen. The sluggishness of the cells has been overcome to such a degree that the telegraphic picture will respond practically instantaneously to any motion. In fact, a reproduction obtained at most in a few minutes with the photo-telegraphic apparatus so far constructed is here achieved in a fraction of a second, so that several phases of a motion can be reproduced within a second.

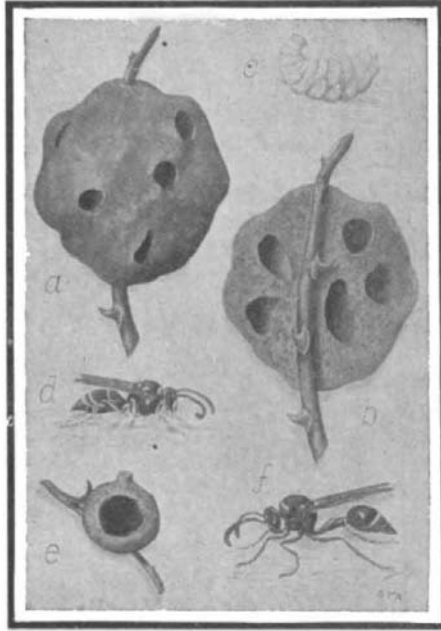
It is hard to realize what an amount of laborious work has been expended in constructing even this comparatively simple apparatus. In fact, each section, with its selenium cell and mirror galvanometer device, is an instrument of precision in itself, while the final apparatus will be composed of 10,000 elements of the same kind. Each selenium cell will have to be wound personally by the inventor, who never intrusts this work to anybody else.

Drawn glass is constantly becoming more widely employed in machine construction because of its extraordinary strength. It is little affected by sudden change of temperature, and resists the effect of fire, heavy loads, and violent shocks. Tests of the effect of loads show the great influence of the thickness of the sheet of glass, a variation of 1/25 inch producing a considerable change of strength. Glass broken by overloading exhibits numerous cracks radiating from the center to the edge. In regard to the fire-resisting qualities, official tests are made at Breslau by the following method: The glass is first heated during 87 minutes, then it is sprinkled 1 minute, and receives the impact of a strong jet of water for 2 minutes. The glass is required to show no crack under this treatment. Drawn glass is easily cleaned and transmits much light. It is made in sheets about 1 1/3 inches thick, measuring about 9 by 10 inches and 13 by 14 inches, and capable of supporting, respectively, 23,000 and 30,000 pounds per square inch.

THE CEMENT WORK OF THE MUD WASPS.

BY S. F. AARON.

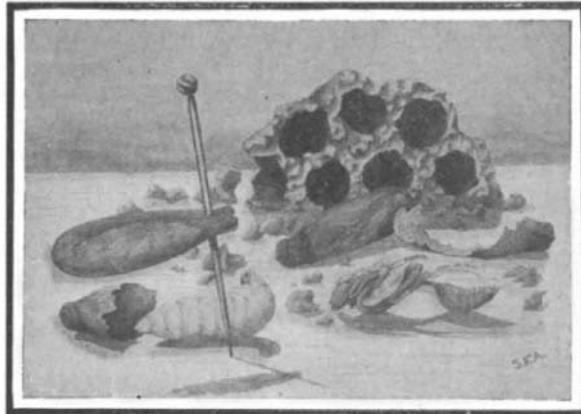
The cocoon-making habit is so common with insects, that there are only comparatively few species that do not possess it in some form or other. It amounts simply to making use of a salivary secre-



The mud mason wasps and their nest.

a is the bulky stone-like nest construction of a species of *Odynerus* and from which the adult wasps have escaped; *b*, same broken open showing cells within, natural size; *c*, larva, and *d*, the adult insect that makes the nest, both enlarged, the latter brown with yellow markings. The jug-like single cell of *Eumenes fraterna* is shown at *e*, natural size; *f*, the wasp, much enlarged. The colors are black or brown with pale yellow markings.

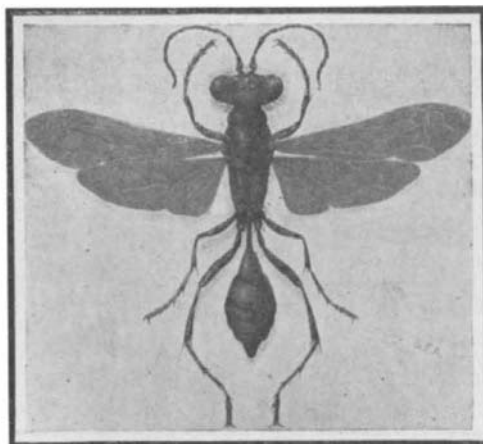
tion, which hardens and toughens upon exposure to the air. Silk is a common illustration, and the spider web is similar, though spun from the posterior of the animal. Many insects spin this thread-like substance; others spread the saliva as a coating within the larval cell or boring; still others make an



A broken nest of blue mud dauber wasp and the larva, pupa, and cocoons taken from it.

The nest is the work of the adult wasp. The cocoons, brown and parchment-like, are the work of the full-grown larva and within which they go through their further transformation.

independent, parchment-like cocoon within the larval cell. Many Hymenoptera, as the bees, social hornets, ants, mason wasps, etc., commonly employ the last method. Many species of most orders use the salivary secretion as a glue, and remarkable illustrations of this can be seen in caddis fly cases under water, for the saliva is cold waterproof when hard-



The common blue mud dauber wasp, *Pelopæus ceruleus*.

The color of the insect is a bright metallic or steel blue, the wings clouded. The body is about 3/4 inch long. An allied species, *Sceliphron cementarius*, with similar habits and as common, is brown with yellow markings.

THE CEMENT WORK OF THE MUD WASPS.

ened. An effect of warm water upon the insect salivary secretion is commonly illustrated by the reeling of silk from cocoons softened in warm water, and any insect cocoon is so affected.

The making of strong-walled, hard-baked earthen cells does not seem to be a sufficient protection for the mud mason wasps in their larval state, and hence a cocoon is spun within the mud cell. While all insect cocoons are made by the larva, certain adult insects possess the power to secrete saliva and use it for nest building and as a means of protection against their enemies.

The hard, compact, durable, and waterproof mud nests of the mason wasps, superior in construction to the mere hardening of mud put together when moist, was always a mystery to the writer until after watching a blue mud dauber wasp at work on the habitation for its offspring.

The wasp makes certain off motions with its head close to its work after adding the mud in its proper place, and it was evident that this was a gluing operation for the purpose of holding together the particles of earth. Upon closer examination, immediately after the wasp had finished a portion of its work, it was found that the clay was slightly sticky, as if a viscid material had been mixed with it. Finding where the wasp obtained its clay, I procured a bit of this, and forced it together on a smooth surface in such a way that it would be under no strain and would naturally adhere, then dried it carefully in the air, and found that it by no means made as strong a substance as the wasp's nest. Another experiment was to drop part of a mud nest into hot water, and the other part into cold water, and note the result. The latter piece merely softened but remained intact after soaking for nearly half an hour, while the other in part disintegrated, showing the presence of the salivary secretion through the clay. Upon taking a piece of this dissolved nest and forming it as the raw clay above mentioned was formed, it was found that the material adhered far more strongly when dry. The salivary secretion, therefore, is probably through the clay and within the cells of certain species, and makes the lining thereof. In what manner, however, the small and slender-bodied wasp can secrete sufficient saliva to glue together the numerous particles of its bulky mud nest is beyond understanding. Waterproof animal glue in very small quantities, mixed with clay or sand, makes a material hard to surpass for the purpose needed. The clay nest of a species of *Odynerus* saddled on a twig or vine in the woods is almost like a stone, and even harder than many sandstones, and is impervious to the water. It is difficult to understand how the little wasps can burrow out of the cells when sufficiently warm weather has brought them through their transformations.

An Electric Rat Destroyer.

A new method for destruction of rats by the electric current has been lately put in use by the municipal electric station of Charlottenburg, near Berlin. The method is a patented one, and is invented by M. Von Biederheim. A special kind of trap on the electric system which was constructed is said to give very good results. The current used in this case is three-phase current, working at a tension of 120 volts, which voltage seems to be sufficient to kill the rats. Direct current at 220 volts can also be employed. The animals to be destroyed, rats, mice, etc., are attracted by bait and enter the trap. By doing this they close a circuit which turns on the current. A set of wires is arranged so that they come in contact with the animals. The creatures are killed instantly. There is no appreciable combustion in the present device. A number of appliances of this kind can be mounted together in a large box. At the electric traps it is advisable to use a method of a special contact which is put on and rings an electric bell or lights a lamp so that it can be noticed when to readjust the trap.

To Distinguish American from Russian Petroleum.

American petroleum can easily be distinguished from Galician and Russian petroleum by the action of colorless nitric acid; that is to say, acid which is not colored yellow by nitrous fumes. The acid should have a density of 1.4 and should have been freed from nitrous vapor by heating it with a little urea. Equal parts of acid and petroleum are mixed in a cylindrical glass jar provided with a ground glass stopper. The mixture is shaken violently for a minute or two. American petroleum assumes a violet color, while the acid upon which the oil floats becomes yellow. Galician and Russian petroleum, on the contrary, turn yellow and the acid becomes brown. When all three varieties are mixed together, the mixture first assumes the violet coloration, which changes suddenly to yellow after long agitation. The reaction is so sensitive that the presence of 10 per cent of Galician petroleum in American petroleum can be detected.