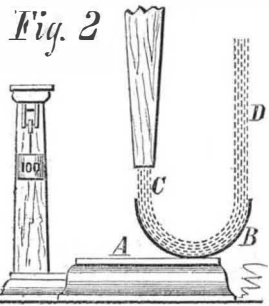


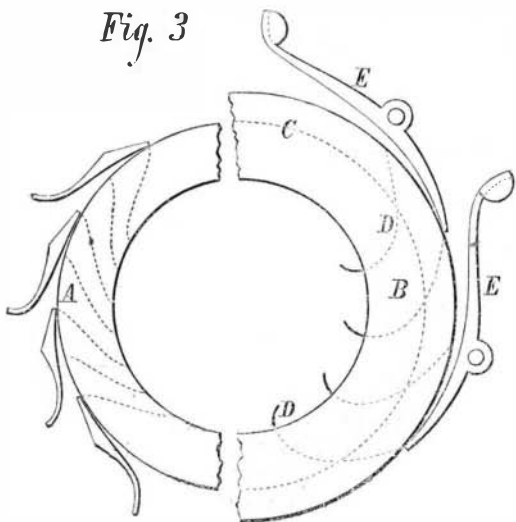
IMPROVED TURBINE WATER WHEEL.

The principal point of improvement, in the turbine wheel represented in the accompanying engravings, consists in the peculiar shaping of the buckets, through which, it is claimed, the maximum power of the water supply is utilized. The idea of this construction, the inventor (Mr. James Craik, of Chateaugay, N. Y.) states, was developed by first causing a column of water to descend perpendicularly upon a horizontal scale platform, and balancing its effect by weights. For the level plate, a curved one was then substituted, of such a shape that the descending column, entering at one end, was deflected around the bottom and returned upward at the opposite side. It was then found that, in order to balance the direct impulse of the falling column, together with the reactive force of the ascending stream, double the weight previously employed was required, and that the curve was a semicircle. This will be rendered clearer by Fig. 2, in which A is the horizontal



platform, B the curved plate, and C and D the falling and rising columns of water. The conditions, however, thus determined are modified through the motion of the point to which the power is applied. Thus, if a wheel could remain stationary and still transmit the impulse, the semicircle would be the proper curve for its buckets; but such not being the case, the wheel rotating, it is evident that centrifugal force affects the water, so that the bucket must be set to counteract the tendency of the fluid to flow toward the circumference.

Fig. 3



The inventor proceeds further to state that, in some well known turbines, the direction of the water must be deflected inward against this centrifugal tendency, a force augmented by the motion of the wheel. This deflection increases the action of the water against the point of the chute, but diminishes that in the inward direction, through the bucket by which the wheel is driven. The force due to deflecting and returning the column of water is thus thrown against the point of the chute, instead of being applied within and against the bucket; and as the action of the column is more intense at this point of reversion than in any other part of its revolution, it is considered evident that a portion of its power is not communicated to the wheel.

In the sectional plan, Fig. 2, are shown diagrams of the ordinary turbine and the Craik wheel, the side, A, representing the former, and B the latter. C is the line of rotation, D the buckets, and E the chutes. From this illustration, the difference in construction will be at once noted; while the amount of loss in the starting power of the wheel can be theoretically computed. In practice, however, the element of centrifugal force complicates the problem; so that from the reports of public trials, perhaps, the best judgment of the efficiency of the device can be formed. Fig. 1 gives a general perspective view, from which other points in the construction of the invention will be understood.

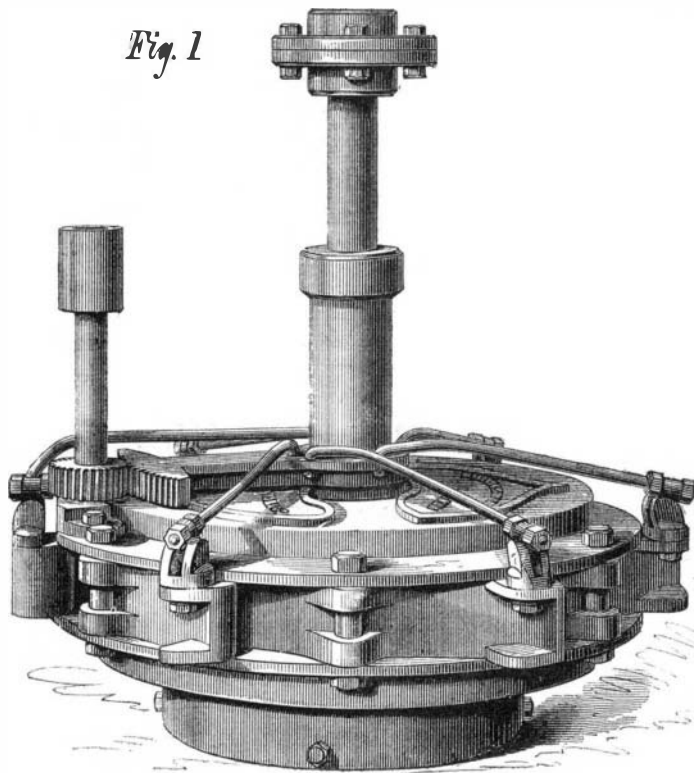
For further particulars regarding sale of wheels, etc., address Whittlesey, Meigs, and Co., Malone, N. Y.

The Sand Club.

This is a weapon used by rowdies and criminals in San Francisco, resembling in principle the sand bag used by the same sort of scoundrels in New York. The sand club is

formed by filling an eel skin with sand. When this instrument was first brought into use, the authorities were greatly puzzled by deaths, apparently from violence, yet no marks could be found on the outside of the body. A burglar was finally captured with a sand club in his possession, made out of an eel skin stuffed with sand. Being closely questioned,

Fig. 1



CRAIK'S IMPROVED TURBINE WATER WHEEL.

he explained its use. When the victim is struck, for instance, on the head, he drops insensible, and soon dies from congestion of the brain. Often the skull suffers no injury from the stroke; and if the person struck recovers sensibility, he gradually relapses into a condition of idiocy. Sometimes a man struck in the body will be knocked down by the peculiar force of the blow, and feel no immediate results from it. In a few weeks, however, the flesh will begin to mortify under the line of the blow, and rot down to the bone.

THE HYDRAULIC PROPELLER.—A NOVEL MODE OF MARINE PROPULSION.

Some years ago a gun boat in the English navy, the Water Witch, was fitted with machinery which propelled the vessel by drawing in water and then forcibly ejecting it through tubes arranged in her sides. The experiment was, in a measure, successful, although we have heard nothing concerning the ship for some time past. The present invention is based on a somewhat similar idea, in so far as it drives the craft by the reaction of water ejected from the hull; but instead of employing mechanism to obtain the supply, it relies on the rolling of the ship, or dash of the waves, to fill the tanks, and thus produce a sufficient head to generate a forcible discharge.

As the plan, in its entirety, is quite novel, and, in the opinion of the inventor, practicable, we leave that gentleman to explain his idea in his own words, premising, however, that, in our engravings, Fig. 1 shows the general application of the device to a vessel, and Fig. 2 a section of the ship with the arrangements represented in detail.

"For a vessel of 36 feet beam, 30 feet depth of hold, and 400 feet long," says the inventor, "I make tanks or penstocks (A, Fig. 2) on each side, for the whole length of the ship, these tanks to be 16 feet high, 8 feet above and 8 feet

below the water line when loaded, to be 5 feet wide fore and aft, and 3 feet wide from the vessel outwards or across beam. In the top of these tanks are holes 6 inches in diameter, and as close as they can be conveniently made, to admit water (whenever, through rolling, or pitching, or high seas, the outside water may be over the tanks). Valves, B, one foot square, are arranged near the water line, opening inwards, for the purpose of admitting water whenever the outside water is above that inside; and there is an opening, C, at the bottom of each tank, shaped so as to discharge aft, and 6 by 12 inches in the opening.

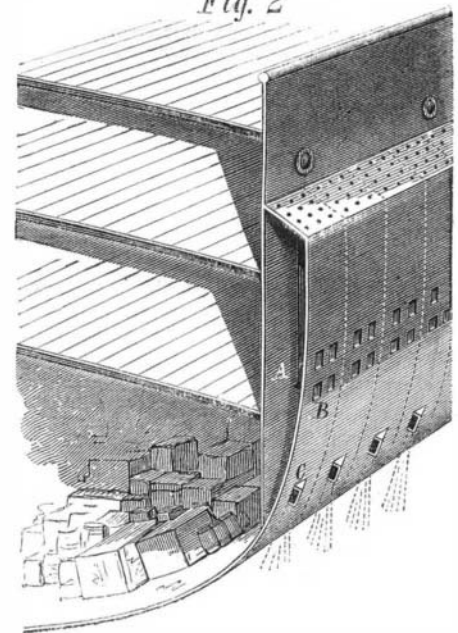
"A ship so fitted will, from the rolling or pitching, or from the dash of the waves, receive water into the tanks when submerged, or whenever (from any of the causes previously mentioned) the water within the tanks is lower than the water outside. And whenever the hollow of the waves is being passed, or the roll or pitch is upward, and the water in the tanks is above the water outside, then the re-action, consequent upon the discharge from the outlets at the bottom of the tanks, will propel the vessel forward.

"The discharge outlet may be made to close by pressure from without, or it may be drawn up by rods attached and leading to the deck, or made to reverse the action; the valves also may be manipulated by rods, if necessary; but it is thought that fixed outlets and plain valves will answer best."

The inventor also suggests a plan for similarly utilizing the pitching of a ship, by arranging two tanks, one at either end: "Valves in the bottom admit water into either tank when down; and when the tank is up, valves will let it discharge into a tube on the bottom of the vessel; said tube discharges both tanks at the stern or each at its own extremity of the ship, or, for the sake of the greater head of water, each at its opposite

end." We are informed that it is especially desired to explain the principle of this device (which, it is believed, is suscep-

Fig. 2



tible of more improved application than the especial arrangement above alluded to), although the inventor is of opinion that the latter would fulfil the necessary requirements.

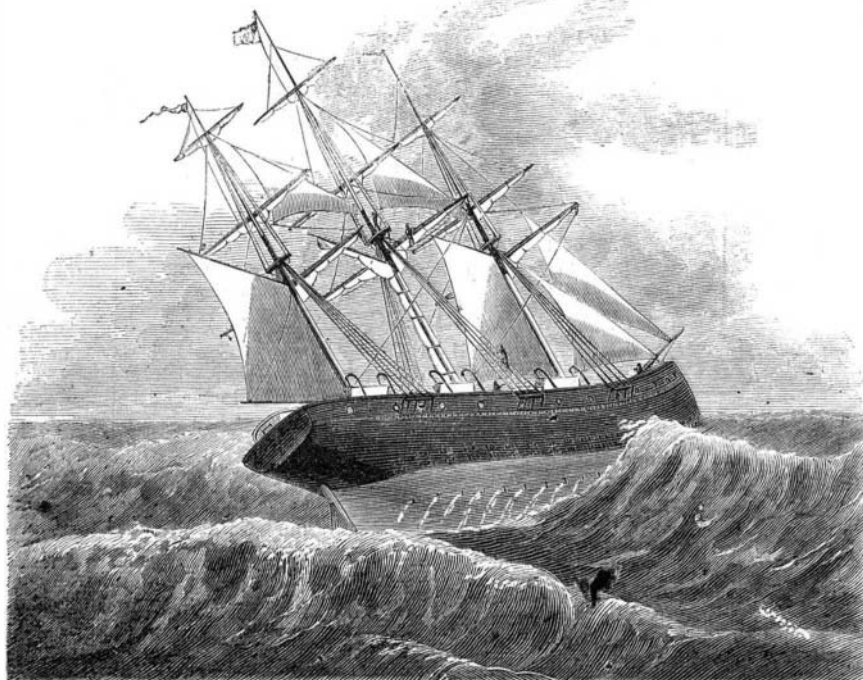
An application for a patent is pending by Mr. Henry R. A. Boys, of Barrie, Ontario Canada, by addressing whom further particulars may be obtained.

Sir Francis Ronalds, F.R.S.

Sir Francis Ronalds, formerly Director of the Observatory at Kew, died recently in England, aged 85 years. To him has been ascribed the invention of the electric telegraph, as it remains on record that, nearly sixty years ago, he devised an efficient instrument of that kind, which he described in a pamphlet published in 1823. The *Philosophical Magazine* thus describes his first success:

"In the summer of 1816 he undertook to prove the practicability of telegraphic communication, at great distances, by transmitting a certain number of electric shocks, for an arranged signal, through insulated wires of considerable length. He laid his wire in glass tubes surrounded by wooden troughs lined with pitch, which were placed in a covered ditch, 525 feet long and 4 feet deep, dug in his garden at Hammersmith. He also suspended eight miles of wire, by silk cords, from two wooden frames erected on his lawn, so that the wire passed to and fro many hundred times, well insulated at each point of attachment, and forming one continuous line, kept separate from contact with other parts. Both these kinds of apparatus served equally to show the instantaneous transmission of the

Fig. 1



BOYS' HYDRAULIC PROPELLER.

electric shock. In order to provide the means of conveying intelligence along the underground line, he placed at each end of it a clock, with a dial bearing twenty letters inscribed. In front of the dial was a disk, revolving with the second hand, forming a screen with a small opening cut in it, so that as the disk revolved only one letter could be seen at a time, and this only for a second. The two clocks were made to go isochronously, the one always presenting the same letter as the other at any given second of time; and the moment chosen at one end was indicated at the other by the sudden collapse of a pair of pith ball electrometers, suspended at each station close to the clock dial and connected with the telegraph wire."

Attempts to enlist government aid in proving the value of his invention being unsuccessful, Mr. Ronald turned his attention to other subjects, and devised several valuable self-registering instruments now in use at the Greenwich and other English observatories. He was knighted in 1870 as a reward for his public services.

Short's Patent Loom.

That very ingenious and useful improvement in the loom, for weaving fabrics of any width, invented by Mr. James Short, of New Brunswick, N. J., which, it will be remembered, was described and illustrated in our columns some time ago, has been made the object of a corporation known as the Short's Patent Loom Company, which, with a capital of one million dollars, has been recently formed under the presidency of Mr. Christopher Meyers.

There is little that we can say, in the present connection, which will tend to augment the praise which we unhesitatingly bestowed upon this invention on our first inspection of its merits; unless it be the fact that others have added the weight of their favorable opinions, and that the device has excited a widespread interest and elicited repeated commendation in the mechanical circles of both this country and Europe.

Under the management of the well known gentlemen who comprise the officers of the new company, the Short loom will not be long in making its way into our manufacturing towns.

THE PERSIAN PAVILION AT VIENNA.

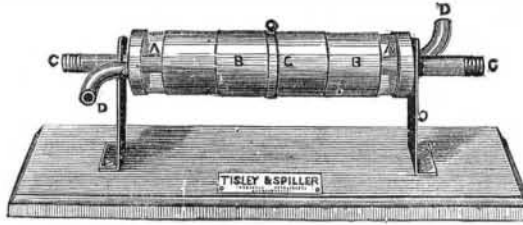
The grounds occupied by the Vienna Exposition comprise five hundred and seventy acres in extent.

In addition to the main building, which occupies a space half a mile long and five hundred feet wide, there are no less than one hundred and forty detached buildings scattered through the grounds, which are devoted to represent special exhibits, some of them illustrating the architecture of various nations. One of these structures, the "Persian Pavilion," is represented in our engraving. It shows in general the modern buildings of the Persian nobility. In its exterior it represents the best forms of domestic Persian architecture of to-day, while its interior contains a large amount of products which illustrate Persian industry.

New Ozone Generator.

Mr. Tisley, of the firm of Tisley and Spiller, has designed a new ozone generator presenting considerable improvements.

A A is a piece of glass tube, of a little more than an inch in diameter, and of as uniform a bore as can be obtained. On each end of this tube is placed a brass cap, bored with two holes, and coated internally with shellac: in the interior of this glass tube, and of a diameter scarcely less than that of the tube itself, but not quite so long, is placed a thin hollow brass box, B B, with its surface made as true as possible by turning in a lathe: this brass box is placed concentrically with the outertube, and is completely coated on its exterior surface with tin, the tin being acted upon to the smallest extent



by the ozone. This hollow box communicates with the exterior of the apparatus by means of the tubes, C C, passing through the center of the caps. It is intended that a current of water shall be kept circulating through the interior of this box, the water being brought into direct contact with its sides by means of a small spiral placed within it, the box being of a slightly less diameter than the glass tube; a small annular space will remain between the two, and through this space the gas to be ozonised is passed by means of the tubes, D D; the box itself is made one of the electrified surfaces, and a strip of tin foil, G, fixed to the outside of the glass tube, forms the other; two binding screws, E and F, serve to make the necessary connections with an induction coil. The water may be kept cool by means of ice.

This instrument is adapted to the purposes of the lecture table, while it is at the same time easily worked. Abundance of ozone can be generated with an induction coil giving a half inch spark only.

We shall be glad to hear of the construction of larger forms of this instrument, which physicists will find very useful in their study of the properties of ozone.—*Telegraphic Journal.*

A Railroad Fire Engine.

The Virginia (Nev.) *Enterprise* gives an account of a new fire engine which the Virginia and Truckee railroad company have had constructed and fitted upon one of their locomotives, in view of the frequent occurrences of fires in wood piles, tunnels, buildings and other property along the line of their road. It stands upon the boiler of the locomotive between the steam chest and the bell, and not a little resem-

bles an iron monkey riding the iron horse. The locomotive, with the little fire fighter mounted upon its back, was recently brought up to the depot, and a trial of its squirting capacity made, which proved highly satisfactory. In case of a fire anywhere on the line of the road, the locomotive and engine, with cars fitted with water tanks, will at once be dispatched to the scene of the conflagration. Meanwhile the locomotive will not remain idle, as it can do switch duty and other work just as well as though it had not the queer little fire monkey riding about on its back.

The Mental Atmosphere.

The probability of the existence of a mental atmosphere, as recently discussed by a writer for the *Reporter*, is a question which has attracted considerable attention, and which in time will probably throw much light on the nature and action of mental phenomena.

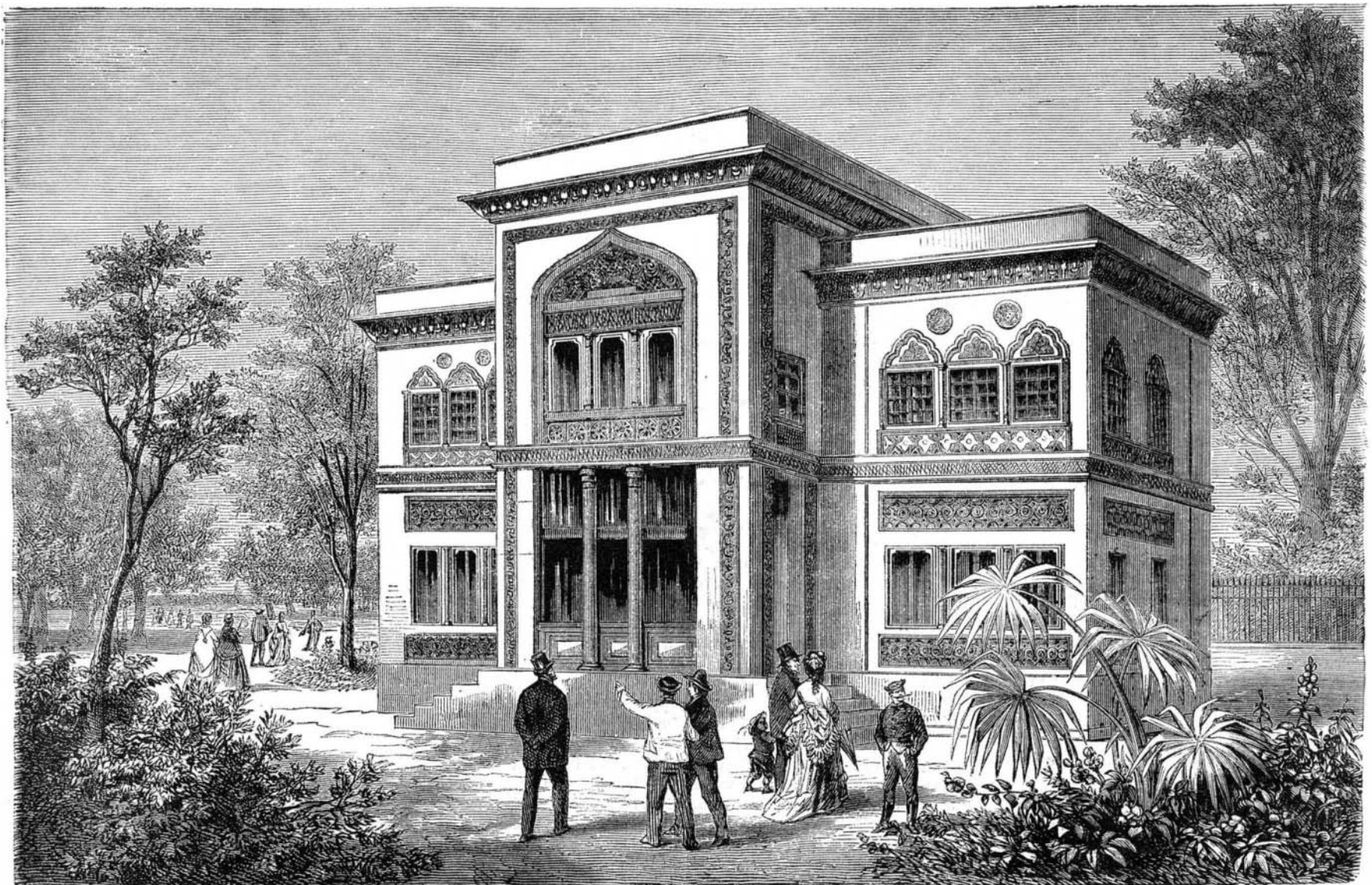
We all know that any mental action results directly in molecular change; it is performed at the expense of certain constituents of the nervous system, notably phosphorus. It transmits a definite wave of motion, at a rate which has been accurately measured, to the distal extremity of the appropriate nerves; how much further, we do not know. Many instances also illustrate the high quality of mental force. It can produce the most important changes, even ulceration or gangrene, in the remotest parts of the body, and aid with equal power in processes of restoration and growth.

That the superficies of the body does not bound its activity numerous facts demonstrate. To pass by the less remarkable and more familiar ones, there is the most positive evidence that those gifted with "second sight," as it was once called, do possess an undefined power of knowledge which transcends the senses. The presence of danger is often felt before any warning reaches us through the senses. Men who live lives of peril know this perfectly well, and are the last to underrate such feeling.

Another form of this external mental power is that by which a strong emotion or a fixed attention on an object will excite a similar emotion or the picture of a similar object in another person without any communication. A certain natural analogy and a special training is required to bring this about. The French "magician" Houdin has established such a mental relation with his son, so that the latter, though blindfold, would at once name an object shown to his father, though the width of a large room intervened.

Undoubtedly as emotional influences are clearly epidemic and contagious, there is nothing incredible in the belief that ideas should also possess equal powers beyond the superficies of the body or the limits of expression.—*Medical and Surgical Reporter.*

J. C. S. says: "I believe John Chinaman strikes the heaviest blow at you newspaper men, as he crowds out other citizens and never buys a paper himself."



THE PERSIAN PAVILION AT THE VIENNA EXPOSITION