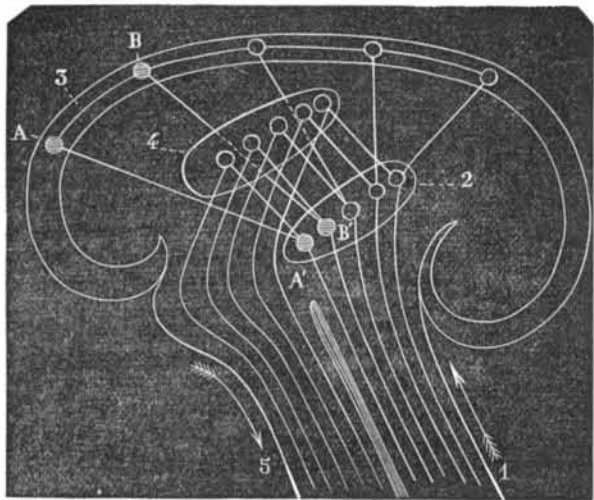


It has been already stated that a motion of the cellules of the optic couches is provoked by the nerves. This movement does not expand itself, however, in that particular region, for the couches are not isolated; hence it continues over the fibers of the white nucleus to end in the cellules which form the peripheric layer of the brain. These cellules are thereby, in turn, modified, and experiments upon living animals and pathologic observations enable the determination of phenomena corresponding to such influence. It has been known for a long time that, in the case of lunatics, the cortical couch of the brain is softened or more or less injured. If that region (3 in the engraving) be destroyed in dogs, a sort of foolishness ensues. The animal has all his sensations, as have lunatics, but he is without knowledge or memory.



Hence, while in the optic couches lies simple perception, in the region above alluded to live the reasoning powers just named.

In order to trace the connection which, therefore, must exist between them, let it be supposed that a brain, free from any impression whatever, is submitted to the influence of an odorous body. The movement of the olfactory nerves is transmitted to cellule, A', of the optic center, and the person recognizes an odor. The vibration continues its course to cellule, A, of the cortical couch, and modifies that region. If, now, the exciting body be removed, the man returns to his former negative condition—perceives nothing. Then, by any means, let the cellule, A, be supposed to be impressed with its proper movement, and thus to be transmitted backward this time to cellule A', which re-awakens to its special activity. The latter, however, corresponds to a perception of an odor and, consequently, the man will again perceive the same, although the object capable of provoking such a sensation is totally absent. Such is the first condition of memory. But this is merely an elementary fact; in order to remember, a relation must be established between what is and what has been felt—a link formed between past and present. Suppose that the odorous body is an orange, and that the senses of sight and smell are both provoked thereby. The visual impression will awaken the center, B', at the same time as the odorous impression excites A'; the former will then provoke cellule B, and the latter cellule A, as already shown. The person perceives in two ways, that is all. Now, after withdrawing the orange, suppose it to be submitted to a single sense; let it be held so that the person can see but not smell it. The cellule, B, is excited to activity as before, from the optic couches at B'; and moreover, being united by its prolongation to cellule A, it will determine in the last the special activity pertaining thereto. This, as already described, is reflected back to A', and the perception of an odor is awakened. Here, then, although the man is too far removed from the orange to smell it, that sense is nevertheless excited, and he will remember that the orange is an odorous body of such a perfume. Not only, therefore, will simple perception be excited, but perception with knowledge.

The cellules of the cortical couch of the brain represent, under form of dynamic modality *in posse*, all acquired ideas, and it is to the anatomic connections which unite these cellules to the optic couches that they borrow the possibility of awakening successively the center of perception to give birth to the phenomena of memory. A dream is nothing but the awakening of this center of perception, by the activity of the cellules of the cortical couch, while this same center is shut off from exterior influence. All the cellules of that couch are united among themselves, and they can mutually awaken their respective activities. It is enough if one operates to cause the rest to follow. The classification and admirable ordering of our knowledge is the work of the Creator; the brain is like tapestry, of which God gives us the canvas and we fill in the stitches in designs more or less grand.

Thus far we have referred to but a portion of the cerebral functions, the functional excitant and the functional matter. The duty of the organ does not consist merely in collecting determined elements; it is supposed to work with some object, to attain an end which is not within the brain itself but outside. There must then be particular motions which the organ projects without itself, and these are termed functional movements.

The path we have just assigned to the impressing movement or vibration of the sensitive nerves to the optic couches and thence to the cortical cellules is now the only route followed by such motion. The optic couches are united by special filaments to another nucleus of cellules called the striated body. Here end all the fibers of the motive nerves placed in the antero-lateral part of the medulla. There is a

presumption already indicating the function of the striated body, which however is transformed into a certainty when, on destroying such portion of the organ in living dogs, the total cessation of physical movement succeeds. Reasoning from this we can explain the functional mechanism of voluntary and involuntary motion.

Involuntary movements take place when the impressing cause, a danger for example, is sufficiently sudden to awaken instantly the activity of the striated body and as quickly provoke, through the intermediation of the motor nerves, a determined motion of the muscles. The movements of the body are voluntary when the impressing cause acts slowly enough for the perception to travel to the cortical couches and arouse the activity of the cellules. It is not until after the examination of the impression, in connection with acquired knowledge, that the movement takes place. In involuntary motion, the effect is a start, a sudden withdrawal of a member, an inarticulate exclamation, etc. In voluntary movement, the previous examination causes a dominant impression to prevail in the optic couches which gives to the effort a motion as if it had been considered and reasoned upon. To the last belong the movements incidental to speech.

SCIENTIFIC AND PRACTICAL INFORMATION.

RELIGIOUS ELECTRICITY.

Recently in New York city, at the dedication of the new and splendid Jewish synagogue, corner of Lexington avenue and 53d street, a portion of the first chapter of Genesis was sung by the choir; and as the words "Let there be light and there was light" were uttered with a grand burst of melody, the whole church was instantaneously lighted up by electricity. Thus it is that modern science lends her aid to give effect to the solemnities of her servants.

RESTORATION OF OIL PAINTINGS.

It appears that the brilliancy of the colors in oil paintings is due to the optical properties of the substance, contained in the oil, known as linoline. By exposure to the air this substance, at first liquid, absorbs oxygen, becomes solid and transparent, firmly enclosing the particles of color. Linseed oil contains 80 per cent of this linoline. By lapse of time and physical and chemical changes, the linoline loses in some degree its transparency and the picture fades, those colors containing the least oil changing most.

Pettenkofer has discovered that the vapor of alcohol will renew the qualities of the linoline, and he restores old oil paintings by placing them over a tight box, in the bottom of which is a flannel cloth, which has been dampened with alcohol of 80 per cent strength. The arrangement should be such that every part of the picture will be exposed to the alcoholic vapor.

THE FAIR OF THE AMERICAN INSTITUTE.

The exhibition building is now filling up quite rapidly, and nearly double the number of articles are in place that was the case at the time of our last visit. There seems to be an improvement in the arrangement of tables and space which admits of a much better display and at the same time economizes much room heretofore wasted in needless passages. Two wooden extensions are in process of construction beside the main building, in one of which will be a Campbell printing press, and in the other a huge saw mill. The excellent and instructive plan of exhibiting an industry by its processes in actual operation, we are pleased to note, is in some cases being carried out. A shoemaking firm enable the visitor to trace the entire manufacture of the shoe from its first cutting from the hides down to the finishing polish. The workmen are seated around the enclosed space, and the shoe passes from hand to hand, each man adding to or perfecting some portion. The extent of the crowd that constantly presses against the railing, eagerly watching the various manipulations, is a convincing proof of the interest taken by the public in such displays. In the same portion of the hall, a number of tailors are at work, cutting out, basting, sewing and pressing men's clothes; and about midway along one of the side aisles, an ivory turner makes billiard balls, chessmen, handles, etc., from the crude material, while another workman engraves monograms and designs on the finished articles. The display of fruit this year is exceptionally large and fine. There are some gigantic grapes and pears from Nebraska, and innumerable plates of apples, of excellent appearance, from various points of the West. The floral exhibit is as yet rather slim, but probably will be augmented when the Fair becomes completely organized. Evidences of improved management are plain; especially in the absence of the vendors of grease compounds and similar nostrums, who made their surroundings hideous with their yells, and provoked the ire, of every exhibitor in their vicinity, during the exhibition of last year.

We resume our brief notices of such inventions as have attracted our attention, from their novelty or especial utility during recent visits. M. T. Boulton's

MACHINE FOR CARVING,

paneling, molding and dovetailing in wood, is an excellently constructed and apparently very efficient device. It is four machines combined in one. The dovetail arrangement is a separate attachment connected with the table, which makes both tenons and mortises at once, so that it only remains to fit the portions together. The paneler is a revolving cutter, working upwards on a vertical shaft under the table. The pattern is fastened on the opposite or upper face of the plank while the lower side of the latter is pressed against the cutter. We examined the operation of the machine quite at length, and found much to admire both in the simplicity of

its mechanism and the beauty of the work turned out. Young's

DIAMOND SAW

is at work in the machinery department, in the form of a neatly built iron model, one fifth the size of the more cumbersome wooden apparatus. The blade, it will be remembered, cuts through the stone by means of carbons or black diamonds which are securely set along its edge. There is an ingenious feed motion for moving the saw, and another device to lift the latter, consisting of an eccentric on the crank pin communicating with a knuckle joint and levers, so that it is allowed to cut only in drawing. The small machine exhibited, we were told, penetrated brown stone at the rate of 14 inches and marble at 7 inches per hour. A novelty about this invention is its application to the cutting of window moldings. Bevels are made by suitably turning the stone, and rounded edges by gradually moving the latter under the saw. The work exhibited to us was very smoothly cut, and especially noticeable for its clean and sharp angles. The apparatus, the inventor thinks, does the labor, in molding, of from 12 to 14 stonecutters. Lyall's

CORSET LOOM

is a most remarkable combination of the Jacquard card with the well known positive motion loom. The cards are hung in an endless chain in a frame work in the upper part of the machine, above the two rows of beams. These communicate with the harness, by the usual mechanism, so as to lift certain portions of the warp at certain times. Four strips or webs of corset are woven at once. To give a clear idea of the operation of the machine is hardly possible in mere words. If the reader, however, will imagine that half the warp in an ordinary loom, for instance, be pushed out of the way, and that the shuttle travels a dozen or so times through the portion left, then that the whole warp be allowed to come into action and the weaving go on as usual, it will perhaps be understood that there will be a gusset in the cloth formed by the half action, so to speak, of the filling. This, though crudely expressed, is about the operation of the Lyall loom. The Jacquard cards govern the quantity of warp to be kept in action, and this quantity is so graduated as to form the requisite gussets, welts, and gores. The shuttle consists of a box enclosing the bobbin, the thread from which passes around and through extended springs. By this ingenious arrangement the slack loop, which would result from the shuttle not passing through all the warp, in forming gussets as above described, is taken up and the thread kept taut. The winding of the finished web brings in another very ingenious though simple arrangement for taking up the irregular portions. There is an endless rubber belt pressing against the cloth from above. Below the latter is a strip of wood filled with needle point projections. The needles, while the whole warp is being filled, catch the entire web and, by the action of the rubber belt, pass it along. But when, however, only a portion of the width is being woven, the needles hook the inoperative part and hold it while they allow the part which is being increased to pass on.

The entire invention, which we have thus necessarily only faintly outlined, is of great ingenuity and may justly rank as one of the most important of modern improvements in the trade to which it relates.

A WIRE BRUSH MACHINE,

which puts us very much in mind of a pin-making apparatus, is at work in the main hall. It makes hair brushes, or in fact brushes for any purpose, out of fine tinned wire instead of bristles. The wire is led from the coil up to the back of a long strip of india rubber, and is moistened with camphene so as to penetrate the same with readiness. On setting the machine in motion, an awl first makes a hole in the band then the wire is brought up, cut by a blade, and dies hold it while a little swedge forms a head upon its end. Then a pusher drives it into the awl hole and through the band, where it remains. The number of pieces in each row is regulated by an ingenious cam device, which causes them to take the elliptical figure peculiar to hair brushes. It only remains to cut the band into suitable lengths and attach it to back and handle to complete the brush.

Near the apparatus just described is an

ENVELOPE MAKING MACHINE.

The paper, previously cut into proper shape, is placed under an angularly shaped plunger, kept covered with gum. This pushes the piece down through a correspondingly shaped slot and at the same time pastes the lower edges. Two arms then swing around and push the paper under another plunger, of different shape, which carries the piece through a square hole of the size of the envelope is to be. The edges are next doubled over by swinging metal plates, arranged on the sides of the slot, and the envelope remains in its place until another arrives, when it falls into a suitable receptacle.

There is a peculiar horizontal steam pump, Eickemeyer's, in a corner of the machinery department. At the middle of the piston is a short arm which, by a ball and socket joint, connects with a yoke on the fly wheel shaft. The piston has thus a partial rotation on its axis, and so forms a self-operating valve for both pump and steam cylinder.

A rather queer invention is the

STEAM BOOT BLACKER,

which consists of brushes which rub the sides and top of the boot and another made in shape to conform to the heel. There are attachments for a supply of water, and other brushes for removing mud, etc. The mechanism is quite simple, and agitates the brushes at a rate which might carry dismay to any one who is afflicted with corns, bunions, or tender feet.