Industrial Education.

An exhibition has recently been held in New York city, under the auspices of the Industrial Education Association, which has brought the subject of the manual training of young people more prominently before public attention than any amount of pamphlet literature could possibly have done, for by showing what the children have already accomplished, the possibilities of the future are conclusively demonstrated.

The exhibit was made up of individual contributions and of collections sent from the different industrial schools throughout the country. They included every department of labor—drawing, modeling, wood and metal working, repousse and leather work, printing, embroidery, sewing, and even plain cooking. Competition for the prizes was limited to pupils under fifteen years of age and to those living within twenty miles of New York. Many of the most complete educational exhibits, however, came from cities at some distance, those from the industrial schools of Philadelphia, Chicago, Worcester, St. Louis, New Haven, and Cleveland being particularly attractive. They illustrated the different steps in manual education, and showed a thorough systematizing that promises the most gratifying results for the future. The New York public schools were not very well represented, but the exhibits from many of the private institutions were worthy of thoughtful study. This was particularly the case in the display of mechanical and engineering models.

Few men of the present untrained generation could compete with these boys of fifteen years and under, in the accuracy and finish of their work. The Gramercy Park Industrial School exhibited a very fine model of a suspension bridge, made from full sized drawings at a scale of one-sixteenth of an inch to the foot. This was the work of seven boys, all under fifteen, and secured the first prize. A very perfect little model of a stone-cutting machine, made by one of the pupils of the Amateur Technical Union, and designed to show the manner of dressing marble, sandstone, and other of the softer building stones, was awarded the second prize in this department. The exhibits of the Hebrew Technical Institute and the Yonkers public schools also contained much that was ingenious in the way of models and mechanical toys. The exhibition was open for a week, and was witnessed by at least 7,000 persons. The bulk of the unsold contributions has been transferred to the training school of the Industrial Association, and will form the nucleus of a permanent exhibition. Arrangements have already been made for similar exhibitions in several neighboring cities. It is confidently believed that this movement for the manual training of American citizens, which has pushed its way in the face of so much opposition and indifference, is now established on a firm foundation, and by making industrial education a recognized feature in our public school system, will give us a generation of skilled native workmen.

Useful Hints for Horse Owners.

Horses are very delicate and liable to many ailments, and persons owning them, who are not very familiar with their nature and requirements, will find the following suggestions, condensed from an article in the Cincinnati *Enquirer*, useful:

Never feed a horse with hay from a rack located above his head, as a draught beats down which is injurious, and the dust is liable to injure the eyes.

A horse should not be overworked, for, like man, he gets tired, and to keep in good condition, he should have rest and good bedding.

Sometimes a horse will not eat his usual food. A mash of oatmeal, milk warm, is about the best food to give a horse under such circumstances. And then a horse should have grass. It is his natural food. A continual diet of hay hardens the coating of his stomach. The food is not digested. Carbonic acid gas is generated, and the horse dies in agony, swelling up, suffering from what is commonly known as colic. Then, again, horses need well ventilated stables, free from draught or damp. The floor should be smooth and nearly level. It should be well drained and light, for sudden change from darkness to light is trying to the eyes, and a damp, offensive odor is injurious. Then, again, the bedding and litter should be carefully separated from that which is foul. They should be well shaken up and dried, and the stall should be thoroughly cleansed; and when the stable is empty, let in a plenty of fresh air.

A horse's stall should be large enough to allow him to lie down comfortably in any position. A tired horse will be glad to lie down with his legs stretched out if he has room; but if you can't give him a loose box, then a light halter block should be used, and care taken to arrange the halter so that it may travel freely to allow the head to come easily to the litter, for rest and sleep are as necessary as food and water.

If a horse comes to the stable wet, he should be rubbed dry before the blanket is put on. If he is standing about in the cold, it should be put on. The legs should be rubbed, and the hoofs always examined for stones.

SMOKE CONDENSED BY MEANS OF ELECTRICITY.

(*Continued from first page.*)

The experiments of Mr. Lodge are of that class which will in time become classical, and which should be made public. It was with this object that the two devices illustrated (Figs. 1 and 2) were constructed. The larger apparatus is designed to show the effect of electricity upon smoke in motion (Fig. 1). It is provided with a furnace, in which may be burned the materials for producing the smoke. The fumes first pass into a box having glass sides, which enable us to see what is going on inside. This is connected with another box of the same kind by means of a horizontal glass tube. The second box has a tube at its top and a device for regulating the draught. Each of the boxes in its opposite sides is provided with brass combs, which are connected with the opposite poles of a Toepler-Voss, a Ramsden, or Holtz electrical machine.

German tinder, for instance, is put into the furnace. The thick smoke which it produces passes through the whole apparatus. If the electrical machine is now put in motion until the sparks pass between the combs, immediately the smoke becomes agitated, and in a little while will disappear by condensation. The boxes and tube become as transparent as before the experiment.

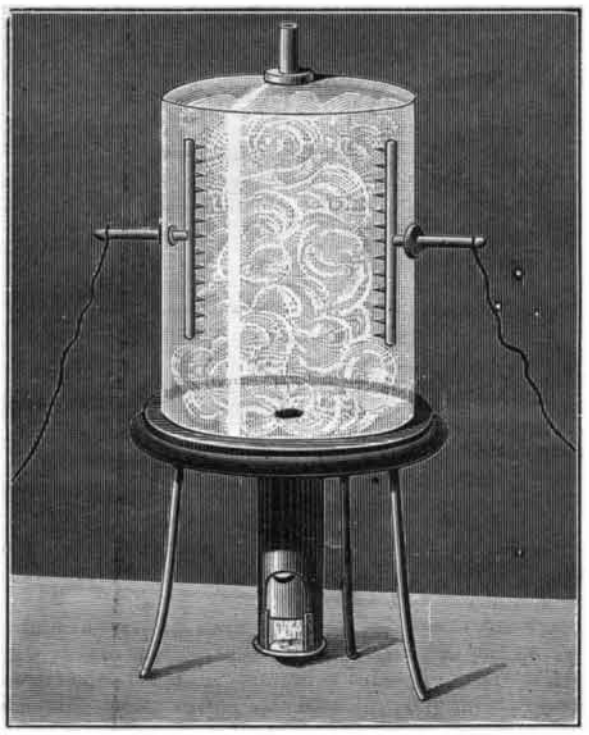

Fig. 2.—SMALL APPARATUS FOR CONDENSING SMOKE BY ELECTRICITY.

The smoke of German tinder can be advantageously replaced by that which is produced by the combination of hydrochloric acid and ammonia. The white thick smoke of hydrochlorate of ammonia condenses very rapidly on the electrified combs.

The smaller apparatus (Fig. 2) is much more practicable for experiment. It shows the effect of electricity on smoke at rest, and gives a clear idea of the phenomenon.

It consists in a glass cylinder having openings in its side, through which are passed the metallic combs. It is mounted on three feet, and is provided with the furnace for producing the smoke. The draught is maintained through the tube in the top of the chamber. Paper treated with niter or German tinder is burned in the furnace, or else the vapors upon which the experiment is to be made are liberated by some chemical reaction. When the glass cylinder is full of smoke, the machine connected with the combs is put in motion, and the vase, smoky and cloudy, immediately becomes clear and transparent, the vapors being condensed.

Tobacco smoke is very quickly and easily condensed by means of this machine.

These phenomena are remarkable. They appeal at once to the savant, the artisan, the student of hygiene, and demonstrate how infinite is the field of discovery.—*Gaston Tissandier, in La Nature.*

Aerial Navigation.

The power of flying, being denied to man, has always been one of the objects most desired by him, though hitherto he has not succeeded in attaining it. If there were any large birds feeding on grains and possessing strong flying powers, they would no doubt have been domesticated long since, and made subservient to man's use, like horses and other animals. But, unfortunately, all large birds possessing strong wing power are carnivorous and untamable, so we shall have to rest content with terrestrial locomotion till we have succeeded in solving the mechanical problem of propelling and steering balloons. We are still a long distance from this result, and it is at least very doubtful whether it will ever be attained.

The difficulty lies in the small specific gravity or density of the air, which demands on the one hand very large vessels, and consequently large surfaces, in order to obtain sufficient buoyancy to lift even small weights, while on the other hand it affords only a slight resistance to the propelling mechanism. A submerged torpedo boat has a cross section which is in a moderate ratio to the area of the propeller, but in a balloon the cross section on which the air acts is enormously large in proportion to the area of any propeller which can be applied. Even ships have difficulty in moving against currents, although only submerged to a small extent, but in balloons the difficulty becomes so great that we are afraid it will not be overcome until we have discovered a material combining the strength of steel with the specific weight of air.

The partial success which attended the trial of the Krebs-Renard balloon, which ascended at Meudon in August, 1884, and proved navigable in a quiescent atmosphere, but failed completely when there was a little wind, seems to have stimulated the other votaries of aeronautics. We hear from Berlin that another dirigible balloon is being constructed there by M. Ganswindt, its inventor. The object is to secure, by means of great size, capacity for carrying power and a swiftness exceeding the strongest wind, so that the balloon shall remain steerable. The speed the balloon is expected to attain is 45 to 50 feet per second. Its dimensions are: Length, 150 meters; diameter, 15 meters; contents, 18,000 cubic meters. The weight will be 430 cwt. It is stated, says the *Mechanical World*, from which the above is copied, that the inventor has already received an offer of £10,000 for his patent, and the editor adds, "which we should certainly accept if we were in his place, as after trying the balloon we should be afraid not to receive any further offers."

Rare Metals.

The necessity for minute accuracy in chemical analysis has just been illustrated in an important discovery by Dr. Strohecker, of Frankfort. Somewhat extensive diluvial deposits of brick clay exist at Hainstadt, near Seeligenstadt. The bricks made from this clay vary considerably in color, according to the temperature at which they are burnt, but the cause of the variation has never before been suspected. It now appears that the layers of this clay are singularly rich in several metals hitherto very scarce, particularly cerium, glucinum, lanthanum, didymium, and yttrium. The first two of these metals are present in such quantities that a more abundant supply may be expected. Ceria, in the form of hydrate, constituted 9·4 and 13·4 per cent of the clay in two layers analyzed, and the color of the bricks seems to be mainly determined by its presence, for the quantity of iron present was very small. The discovery is therefore of immediate value, and will doubtless lead to further researches on the elements, which may prove to have much more importance in the economy of nature than has been supposed. It is evident that we must not neglect these little known elements, for, apart from their scientific interest, we cannot tell what undiscovered uses may lie in them. We do not know, indeed, whether they are really as scarce as has been supposed.

COMBINED TRUSS AND SUPPORTER.

The principal feature of the improvement herewith illustrated is the combination of an abdominal supporter with a rupture pad acting independently of the abdominal supporter and having a decidedly inward and upward pressure. Thus the abdominal supporter relieves the ruptured parts from all undue pressure arising from the weight of the abdomen, and the rupture pad has only to hold the small portion of the intestines affected by the rupture, for which a very light pressure by the pad is sufficient. Another feature of the improvement is the application to the pad of a coil spring which affords an easy inward and upward pressure, and which can readily be exchanged for one of lighter or stronger pressure.

SHULZ'S COMBINED TRUSS AND SUPPORTER.

A patent for this invention has recently been issued to Mr. Henry A. Shulz, of Brooklyn, N. Y. Further particulars will be furnished by the Smith Truss Company, 25 Temple Court Building, New York city.

Detection of Minute Traces of Color.

Interesting experiments have been made by E. L. Nichols on the quantity of coloring matter which must be mixed with a perfectly white powder (carbonate of magnesia) before the human eye can detect it. From these experiments it appears that red and yellow are most easily detected, 16 and 17 parts respectively being sufficient for detection when mixed with one hundred million parts of white powder.