tive. The late Dr. Seguin demonstrated many years ago, that the undeveloped brains of the feeble minded could be stimulated to healthy growth by patient and systematic training of the muscles and the organs of sense. Dr. Browne looks to a corresponding physical culture of those of normal brain endowment to give them the increased brain capacity which will fit them for the severer needs of our increasingly active intellectual life, and at the same time make them better able to resist the inroads of mental disease.

"Muscular exercise," he says, "has been hitherto thought to expand the lungs, quicken the circulation, and brace the nerves; but to this must now be added the pregnant idea that it also contributes to the brain growth and mental evolution. As a large part of the brain is composed of motor centers, we may, in the nascent state of the organ, powerfully act on the brain, by putting into methodical exercise the muscles which we know to be directed by its various parts; and especially the centers governing the movements of the hand ought to be brought into training by careful drill of manual movements, so that, in due time, a cunning right hand may be the servant of every man to some mechanical art, and of every woman to some technical work."

And not only is it possible, as Dr. Browne suggests, to fortify the young against the inroads of mental and nervous disorders by the development of brain capacity, stability, and symmetry, through manual training, but there is gained also, by means of such training, the additional safeguards, which come from much dealing with realities, from having always at hand the means of healthful recreation, and from the conscious ability to do, if necessity compels, something that will win support.

Industrial education thus takes on an importance far greater than has hitherto been accorded it. It becomes a necessity, not merely to those who are likely to spend their lives as artisans, but even more to those who may never earn a day's wages at the bench—men of independent fortune, professional men, business men and women in all the walks of life, to whom physical training may mean not bread and butter, but mental health.

## STEAM ENGINES FOR ELECTRIC LIGHT MACHINERY.

A field for the manufacture of steam engines specially adapted to the propulsion of dynamo electric machines has been opened by the recent extensive and rapid development of the electric light.

It is the aim of inventors and manufacturers of electric lamps to provide automatic adjustments which will secure the greatest possible uniformity in the light, and these adjusting devices are called upon not only to compensate for unequal combustion of the carbons, but also for the irregularities of the propelling power, every variation of which produces a corresponding variation in the strength of the electric current. This effect is more strikingly illustrated in electric lamps of the incandescent variety, by whose regular fluctuations the strokes of the engine may be sometimes counted. The highest measure of success in electric illumination demands the employment of high speed engines running with great uniformity.

It requires but little reflection to perceive that as the electric light is the continuous product of mechanical energy, it must be of primary importance to uniformity in the product that the supply of energy should be uniform.

Sir J. W. Bazalgette, in his report upon the electric lights which have proved so successful on the Thames Embankment in London, states that the success reached is in great measure due to the remarkable steadiness and regularity of movement in the 20 H. P. steam engine which supplies the lights, and which was built by the Messrs. Ransomes and fitted with their patent automatic expansion gear. This engine, during a period of twelve days, running at an average speed of 142·36 revolutions per minute, has been found to vary not more that one-twelfth of a revolution under suddenly varying loads.

In view of the progress which this kind of illumination is making in this country, together with the great variety of automatic governing valve gear of great excellence in use, it would pay some of our best engine builders to give attention to this special class of work. The field is large and constantly growing, and offers rich promise to enterprise.

## NEW THEORY IN REGARD TO LUNAR VOLCANOES.

M. Faye, according to the *Chronique Industrielle*, recently delivered a lecture at the Sorbonne, in which he criticised the prevalent belief that volcanoes exist on the moon, and offered a theory of his own to account for the objects that have been taken as craters due to volcanic action. Water, said he, is the sole cause of volcanic eruptions. Now, on the moon there is no atmosphere; this is a fact recognized by every one, and it is absolutely confirmed by observation of occultations. Since there is no atmosphere there, of course there can be no water, for the latter would instantly evaporate under such conditions, even did it exist. So, since there is no water in the moon, it follows that there can be no volcanic action and consequently no volcanoes. But there are circular cavities on the moon, nevertheless. What are they, then, and how have they been formed? To account for these, M. Faye asked his auditors to imagine a river frozen over from shore to shore. Such being the case, the tides will exert a pressure on the under surface of the ice, and if a hole exist in the latter the water will quickly issue up through it and congeal around its edges. And so each successive outflow will freeze over its predecessors until the successive layers form a marginal ring of some height around the aperture. From this we may get an idea of the alleged lunar volcanoes, which are diametrically the opposite of those that exist on the earth. The craters of our terrestrial volcanoes, that of Vesuvius particularly, are at the top of high mountains; the craters of the so-called lunar volcanoes are, on the contrary, in the center of low hills. The bottom of terrestrial volcanoes is greatly elevated above the mean level of the surrounding land; that of the alleged lunar ones is deep down beneath the surrounding ground. Terrestrial volcanoes are conical mountains thousands of feet in height, having at their summit a crater some hundreds of feet in depth, while the circular cavities on the moon are wells several thousands of feet deep and surrounded by a sort of curb some hundreds of feet in height. The circular hollow called *Copernicus*, for instance, is 11,000 feet deep, while its marginal hill is only about 2,600 feet in height. These circular cavities, then, are veritable wells, and they were formed, according to M. Faye, as follows:

At the epoch in which the moon, covered with a thin solid layer, took less than a month to accomplish its revolution around the earth, tides were created on its surface by the latter. The incandescent and liquid mass, covered by a thin coating that might be well compared to an egg shell, was attracted by our planet and thereby caused to dash up against this solid layer. Now, if we suppose that small orifices were accidentally created in various parts of the still thin crust, the waves formed by the tide would cause some of the molten mass to issue through these apertures, while the surrounding crust would everywhere else resist it. This liquid would flow over the edges of these well holes, and being unprotected against the cold of space would at once solidify. And, as we have just seen in the case of the frozen-over river, at every tide the margin would increase in height by the superposition of new outflows. Finally a moment would come in which the bottom would itself solidify. But this being situated at a great depth, and being protected against external influences, would remain for a short time in a pasty condition. If at such a moment a new flux should take place, the middle of the pasty bottom would be thrust up, and in solidifying would remain considerably elevated in comparison with the surrounding portions of the bottom. Thus may be explained the existence of the peaks which are observed in a large number of these lunar cavities.

Such is an outline of M. Faye's new theory. "If," says the author, "I am asked by what considerations I am led to make known the results of my observations and researches, I answer that I am seeking, first, to banish from science a gross error by proving that these lunar cavities are not volcanoes, for no explosion can take place where there is no explosive material. Then, again, from a geological point of view, I have wished to study in the formation of the moon those phases of the past which may give us an idea of the phases to come. Although the geology of the moon differs completely from that of the earth, this very opposite nature is a valuable element of discussion. It will serve to banish vain theories and to put in a clearer light the phenomena of which the earth has been the theater."

## WHITE ANTS IN COURT.

An intimation of the mischief done in regions infested with white ants, by the wood destroying habits of these insects, is furnished by a recent law suit in New South Wales. The plaintiff, a contractor, had received from the defendant instructions to repair a house which had been damaged by white ants. As the work proceeded, the plaintiff found that the house was almost eaten away by the white ants, and that a considerably increased expenditure would be required to put the house into thorough repair, and he informed defendant of the fact. The bill for the work done was disputed as excessive.

A considerable amount of evidence was taken on both sides as to the work performed, and it was stated that an estimate could not be given of the contract price of work, as the white ants operate during darkness, and the extent of their ravages could only be seen as the work progressed. One witness described the house as being so seriously injured that new material would be required throughout, and the best way to have dealt with it would have been "to put a fire stick under it." The estimated cost of the repairs before the work was begun was about $1,150. The defendant had paid $2,000, and the court adjudged that he should pay $230 more.

## THE HUMANE ASSOCIATION'S CATTLE CAR COMPETITION.

The first result of the American Humane Association's offer of an award of $5,000 for an improved stock car, capable of carrying live animals long distances without suffering or having to be unloaded to be fed and watered, appears to be an accumulation of business not at all anticipated by the officers of the association, and not altogether in harmony with objects for which the society was organized.

The judges' circular, No. 2, dated Feb. 1, acknowledges the receipt of 420 models and about 200 plans and sketches; and (since Jan. 1, the limit set to the receipt of plans and models) they have been overwhelmed with correspondence asking why the award is not made or the models, etc., returned In other words, the office of the association has been turned into a sort of local patent office, for the work of which it was ill prepared. The judges suggest that, even if they neglect their own business and devote their entire time to the examination of the models, plans, etc., and the comparison of them with the 111 U. S. patents already granted for stock cars, several months must elapse before a decision can be arrived at. Indeed it is likely that months will have to be devoted to clerical and expert work before the special competitive examination by the judges can begin. When made, the result will be announced to the association, as specified in the circular of July 12, 1880.

Obviously the competitors will have to be patient; and if any one feels himself slighted by the silence of the association he should first make sure that his model has been received or was intelligibly marked, since thirteen of the models received had no names or addresses on them, and it is probable that others are lying unclaimed in express offices for lack of prepayment of charges.

## A TELEPHONE REISSUE.

The Patent Office, after careful hearing, has granted to Mr. E. Berliner, a reissue of his original telephone patent, of January 15, 1878, with several new claims, among which is one that virtually awards to the above author the priority of invention and use of the local battery in conjunction with telephone instruments.

Prior to the invention of Mr. Berliner it was necessary to yell very loud in order to make anybody hear at any considerable distance through the telephone, and even then the speaker's voice was heard quite faintly.

But now, with this improvement added, the telephone is rendered so sensitive that conversation in whispers may be readily carried on, and the ordinary tones of conversation are delivered by the instrument in the most perfect and admirable manner. Mr. Berliner is entitled to the highest honor for his remarkable invention, which is now used in all parts of the world. The patent is held by the National Bell Telephone Company, of Boston, Mass.

## Spontaneous Combustion of Dyed Goods and Yarn.

The heaviest loss that has occurred in 1880, within the line of mutual insurance, has again been caused by the spontaneous combustion of dyed cotton yarn of various colors; and while this particular fire opens some entirely new questions that are now under investigation, it gives us reason, says Mr. Edward Atkinson, President of the Boston Manufacturers' Insurance Company, to renew our warning against a danger which has been the cause of thirty per cent of the losses that we have incurred since January 1, 1878, a period of two years and nine months.

Blacks, browns, slates, and Turkey red goods, dyed with cutch, gambier, aniline, iron liquor, and chromic acid, appear to be most liable to oxidation, if rolled hot or warm from the dry cans or piled hot from the dyeing kettles. In almost all the premises insured by us, complete arrangements have been made for thoroughly cooling cloth and yarn as it comes from the cans or kettles, or special fireproof apartments have been provided for storing rolls of cloth from the dry cans over night. Yet, within the first month, hot rolls of cloth have been found by one of our inspectors in one of our risks.

This last fire discloses the fact that old yarn, some of it imported five years since, and some made two years since, that had been softened with a mixture or emulsion of olive oil and soda to prepare it for knitting, took fire spontaneously when stored in the attic of an old-fashioned mill, where the heat was doubtless excessive.

Whether the combustion ensued from the emulsion or from the dyestuffs is the point now under investigation, but it is evident that care should be taken not to expose some of these colors to excessive heat, whether the goods are freshly dyed or old.

The present indications are that the combustion in this case occurred from the oxidation of the dyes used in the black yarn, combined with the olive oil used in the emulsion, as we have succeeded in promoting spontaneous combustion with this color, but not with any other of those that have been prepared for our trial, precisely like those stored in the attic of the mill burned.

## American and French Silks Contrasted.

Foreign correspondents complain very much of the miserable quality of the silks and satins from the Lyons looms; that, as they scarcely outlast half a dozen wearings, plush, brocade, and Sicilienne take their place. This emanates from France, but the English have for several years previously acknowledged the superiority of the American silks, brocades, damasses, and armures, as well as gros-grains, which are free from all injurious matter, and will neither crack nor fray, but outwear several French silks. Another great defect in black silk is "wearing shiny," which comes from the action of the soap and alkali developing a grease under friction. Cracking arises from the strain of the delicate silk to carry the heavy load of iron, potash, logwood, soda, oil, soap, and other chemicals used in foreign treatment. Raveling a thread from the silk, passing it through, and straining it over the fingers, is a good test. In heavily dyed silks the thread will feel rough and lumpy, and if a small quantity be burned it will simply smoulder, leaving a yellow, greasy look, while if pure it will immediately be consumed to a crisp, leaving only a pure charcoal. A new feature in silk trade has been the importation of raw silk from Asia through the Suez Canal and the Mediterranean direct to New York, though the greater part of the Asiatic importation of silk comes across the Pacific Ocean, and is brought here by rail.—*N. Y. Tribune.*