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(Illustrated articles are marked with an asterisk.)

MEDICAL PRACTICE IN EARLY TIMES.

History teaches us that, at the dawn of civilization, the two vocations of medical practice and spiritual authority were usually combined. This was the case over all the world. Even when Greece, that most advanced nation of antiquity, had reached quite a high standard in art and literature, the priests were also physicians, and the famous temples of Æsculapius were the special resort of patients suffering from severe ailments, who implored the assistance of the gods by the intervention of the priests. It is not known if the latter had a regular tariff of charges; but the gratitude of the patients was often manifested by gifts, and tablets were erected in the temples, giving a full account of the symptoms of the disease and the means of cure. These tablets, of course, soon became very valuable to all who studied the medical art, and in this way these temples became medical colleges, as well as dispensaries, and the incorporation of the ecclesiastical and medical professions was more and more complete.

There was, however, a prevalent notion, which for a long time paralyzed all attempts at the relief of society from epidemics, etc., by sanitary regulations; it was the belief that every ailment was due to the revenge of offended divinity. These ideas prevailed among the best informed of men, and religious acts, such as sacrifices, invocations, pilgrimages, penances, etc., formed the chief part of all medical treatment. We regret to say that, even in our own times, such notions prevail among certain classes, especially among the ignorant, who indulge in prayers and useless penances, but neglect personal, domestic, and municipal cleanliness, and appear to be totally unable to realize the beneficial effects of fresh air and sunlight on all highly organized beings.

It was reserved for the great and good Hippocrates to entirely upset the theological treatment of diseases, and to replace it by a practical and material theory, founded on the most careful and admirable observations concerning the causes, symptoms and general courses of different ailments. This glorious revolution was indeed one of the greatest triumphs of human genius; but it was not accomplished with out a struggle, which ended in the complete separation, among civilized nations, of the business of the priest from that of the physician, and it is for this, especially, that the memory of Hippocrates should be honored as a successful reformer and intellectual revolutionist. His works abound with the proofs of his profound study of the medical art; and his descriptions of symptoms have never been surpassed. For instance, his sketch of the physiognomy of the dying is still copied in our works on the practice of medicine, and the characteristic appearance of the patient in that last stage is so inimitably described by the great master that it is still called "the Hippocratic countenance."

While rejecting all the imaginary notions about supernatural influence, in vogue in his time, he attempted to impute all symptoms to their true physical causes, and to substitute the action of Nature for the action of the gods. He did not give himself any concern about the opposition of the priests, to whose interests it was to refer every disease to the anger of some divinity, and who taught that health could only be restored by a reconciliation with the same, by gifts to his temple, sacrifices, etc. Hippocrates was the first to teach that every disease will run its natural course; and his greatness consists chiefly in his masterly conception of pathology, which caused him never to attempt to check or prevent this physical process, but to watch the critical period, and to modify and bring relief at the right moment by assisting in the elimination of what he called the peccant humors, which he considered to be, by poisoning the blood, the cause of almost all ailments. By his fearless war against superstition, he created a beautiful example to all who have succeeded him in his important profession, teaching them not to hesitate to resist ignorance and prejudice, and courageously to encounter the opposition and disapproval of their contemporaries, being sure that the appreciation of a not very remote future will offer a glorious reward for those who are in the advanced guard of progress.

THE HORSE POWER AND THE POWER OF THE HORSE.

Some of our readers are finding great difficulty in reconciling the definition of horse power, as given by writers on engineering subjects, with their own knowledge of the power of the horse. There are three terms which we must define with precision, before attempting to place the subject before our readers in such a manner as shall give them an accurate notion of the meaning of the term first referred to.

Force is defined to be anything which produces or tends to produce motion, or change of motion, in bodies. The force of gravitation, of electrical and magnetic attraction, of heat repulsion, of steam pressure, and of a compressed spring, are illustrations. It is measured by the weight which will counterpoise it.

Work is force acting through space, and is measured by multiplying the measure of the force by the measure of the space. A force which overcomes a resistance of 5 pounds through a space of 7 feet, does 35 "foot pounds" of "work." A weight of 2 tuns is raised 5 feet, or 60 inches, by the expenditure of 10" foot tuns," or its equivalent, 120 "inch tuns."

Power, as the term is only properly used by engineers, is the amount of work done in any given example, in some known time. Its unit is called the "horse power." Thus, a machine doing 33,000 foot pounds of work in a minute develops one horse power. The same machine, working in the same manner, would do 550 foot pounds of work in each second, or 190,000 foot pounds during each hour that it might be continuously worked. The horse power, therefore, is a rate of work.

A horse cannot usually exert a great power; but the term was first introduced by James Watt, and since its actual value is a matter of no consequence so long as it is well understood what that value is, engineers have not thought it advisable to change it. The actual power of horses varies immensely, being sometimes more than a horse power, and often much less. The average power of a good draft horse is about three quarters of a horse power, but it can only be sustained about eight hours a day. The same horse drawing in a gin or a mill would exert a power which would average for eight hours work a trifle more than a half horse power. An ox is said to have about two thirds the power of a horse, or to be capable of exerting about a half horse power. The ox can pull as heavy a load as the horse, but moves more slowly, and hence does less work in a given time, and rates less horse power.

The mule pulls about one half the load of a strong draft horse, at about the same speed. He may therefore be rated at $\frac{1}{2}$ of $\frac{3}{4}=\frac{3}{8}$ of a horse power. The ass rates at about $\frac{1}{4}$ of the power of the horse, or $\frac{1}{4}$ of $\frac{3}{4}=\frac{3}{16}$ horse power.

On a direct pull, the average lift which a horse can exert in steady work over a single pulley is about 120 pounds. The maximum is probably double this figure. Professor R. H. Thurston, in the paper on "Traction Engines" of which we gave an abstract some months ago, says: "Experiments made by Captain Robert Merry, at the Jackson Iron Mine, Negaunee, Mich., and the observations and experiments of the writer, indicate the maximum direct traction force of a good horse to be about 250 pounds." This weight, raised at the rate of 250 feet per minute or about three miles per hour, would give $250 \times 250 \div 33{,}000 = 1.9$, nearly two horse power for the power of such an exceptionally strong animal; but we should not expect any horse to keep up such exertion for more than a very short space of time. The estimates before given were for average work, kept up eight hours a day for days and weeks together.

British engine builders use a term, in giving the size of steam engines, which is known as "nominal horse power," and is much smaller than the actual power of the engine, which is usually known as the "indicated horse power," or the "dynamometrical horse power," according as it is determined by the indicator or the dynamometer. Thus the engines of the British iron clads, Devastation and Thunderer*, if driven at the slow speed and with the low steam used in the time of James Watt, would be of about 800 horse power. They still are said to be of 800 nominal horse power, but the Thunderer, in her recent trial, developed 5,700 indicated horse power. In this country, this unfortunate and confusing application of the term "nominal" horse power is almost unknown, and we indicate the size of an engine by specifying its diameter of cylinder and length of stroke. The engines of the Thunderer, for example, have two cylinders for each of her twin screws, which are 88 inches diameter and 39 inches stroke.

CHEMICAL HEAT INDICATORS.

A method of exhibiting the temperature of solutions in vessels without the use of the thermometer is suggested by the *British Journal of Photography*. It consists in painting the exterior of the vessel with the double iodide of mercury and copper. Two drachms of iodide of potassium are dissolved in an ounce of water, to which is added a small quantity, drop by drop, of a saturated solution of bichloride of mercury (corrosive sublimate) until the red precipitate ceases to dissolve. A minute quantity of the iodide will then clear the solution. 1½ drams of sulphate of copper dissolved in the least quantity of water are now added, when the desired compound is precipitated. The clear liquid is then poured off and the precipitate dried for use. The double iodide of mercury and copper thus prepared is a rich red crystaline powder, distinct in color from the simple scarlet iodide of mercury.

When paper or other substances are stained with the double salt mentioned, the red color changes to black when heated to 130° F, and the intermediate variations of temperature are indicated by modifications from red to black. The red color returns when the temperature sufficiently falls.

Professor Mayer, of the Stevens Institute, suggested some time ago the use of the iodides of mercury and copper as a paint for car wheel boxes, to indicate the heating of the journals. He also used the salts for illustrating the spread of heat in conducting bodies, and also for the demonstration of the unequal heat-conducting powers of different sections of crystals. It seems quite possible that chemical investigators may be able to discover other salts still more sensitive to heat than those mentioned, and that this method of heat indication may become practically useful for many purposes.

LEAPING BY MACHINERY.

Among the sensational amusements now going on in this city, the performances of a young feminine gymnast, Lulu by name, at Niblo's Garden, are noticeable. The deliberate attempts at neck-breaking which she nightly undertakes attract immense audiences of ladies and gentlemen, who enjoy the sensation amazingly, and recommend it to their friends as a worthy and thrilling sight.

The astounding feat consists in what appears to be a direct leap, thirty feet high from the stage floor, and the grasping of a pair of bars at that elevation, directly over the heads of the audience. We need hardly say that the flight is assisted by mechanism.

The performer, costumed in stage tights, totally unembarrassed by petticoats, exhibiting all the charms of her well proportioned physique, stands upon a small iron step, which forms the extremity of a lever that projects up through the stage floor. Below the stage and connected with the lever is a weight of 4,000 pounds and a trigger arrangement. At the appointed moment, the gymnast places herself upon the step, assumes the required position, an attendant taps the floor as a signal, the trigger below is moved, and the gymnast shoots up like an arrow through the air to the bars above. It is a dreadful trick, for the least variation in the force of the mechanism, or the most trifling deviation in her course through the air, would drive the gymnast away from the friendly bars and send her headlong upon the iron chairs below. We sometimes marvel at the strange taste of the Spaniards who still find enjoyment in the gory spectacle of the bull fight. But what shall we say of the sensibilities of Americans, whose popular evening entertainments depend for their chief zest upon the antics of a company of half nude ballet dancers coupled with the fearful risking of hu man life by methods such as we have described?

LOSS OF THE POLARIS.

Telegraphic despatches bring the news of the probable loss of the United States exploring steamer Polaris and the end and failure of the Arctic exploring expedition. On the 15th of October, 1872, in lat. 77° 35', a party of the crew, altogether some nineteen souls, left the ship to place some provisions on an ice floe. A severe storm came on, causing the Polaris to part her moorings. The few remaining aboard got her under steam, but were unable to render any assistance to their comrades on the ice, who, to their dismay, saw their vessel disappear among the surrounding fields and bergs. The tide and wind, it seems, fortunately drove the great floe, bearing the survivors, down through Baffin's Bay and Davis' straits until, on the 30th of April last, they were rescued after one hundred and ninety-six days on the ice, by the British steamer Tigress, in lat. 53° 30' near the coast of Labrador.

Captain Hall died of apoplexy on the 8th of October, 1872, after returning from an expedition on sledges, in which he reached within 7° 44' of the North Pole. The Polaris, the survivors state, was without boats and leaking badly at the time of her breaking adrift, so that there is but little chance of her present safety. The sufferings of the rescued party are described as terrible, but all were taken off their perilous raft uninjured and in comparatively good health.

IMPORTANT DECISION IN RESPECT TO ASSIGNMENTS.

We publish, in another column, the text of a recent decision of the United States Circuit Court, District of California, by Judge Sawyer, in which he holds, substantially, that the purchaser of a patented article, obtained from a *bona fide* owner of a territorial patent right, may use and sell such article outside of the territory owned by the seller. Thus, in the case of the Egg-case patent, the Judge held that the purchaser, who bought the patented goods of parties owning the patent for Illinois, had the right to send the goods to California, use and sell them there, notwithstanding the protest of the party who held the patent for California.

If this doctrine is sound, then the selling of patent rights in specified territorial divisions is a farce, and new restrictions become necessary in the assignment, as Judge Sawyer suggests.

THE DEATH OF LIEBIG.

It was in 1826 that Justus Von Liebig, then only 23 years old, and already Professor of Chemistry of the University of Giessen, Germany, opened there the first chemical laboratory for the use of students in practical chemical operations, and thus soon attracted pupils from nearly all parts of the civilized world. By this, the little university at Giessen soon rose to great eminence as a scientific school, and was, erelong, in advance of all others. The influence which such instruction had on the industrial progress of Germany and of all Europe cannot be over-estimated, and is one of the most

*Vide Science Record, 1873, p. 222.