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SCIENTIFIC AMERICAN SUPPLEMENT

No. 562.

For the Week Ending October 9, 1886.

Price 10 cents. For sale by all newsdealers.

"THE REMEDIES OF NATURE."

In a series of papers on "The Remedies of Nature," an eminent English physician comments upon past and present medical treatment; and though presumably it is the intention of these papers to convey important and timely information to the medical faculty, they furnish at the same time a hint to the patient at large which, if he be wise, he will hasten to avail himself of. Perhaps it is the author's intention that he should, for at one moment he seems to drop his voice to a whisper while admonishing the fraternity that they must stop dosing and drugging, and at another talks in stentorian tones over their heads, warning the public to look to nature rather than to art for relief from all the minor ailments to which humanity is heir. It may, perhaps, be a disappointment to them who have come to lean upon their medical adviser for advice and rely upon him for health, to learn that the effects of fresh air are more potent and enduring than artificial stimuli, and exercise more to be depended on than jalap, attenuations of aconite and belladonna, or even bread pills. He inveighs against the practice, now unhappily prevalent, of attacking the effects or outward signs of a disease instead of the cause or seat of the malady—a practice which sometimes proceeds from ignorance, though it is often adapted to allay the fears of the patient.

"A swelling suddenly appears on a man's knee, whereat," says the author, "he flies in alarm to his physician. The latter sets himself diligently to work to remove the swelling, and, to the joy of his patient, succeeds."

This, he says, is like stopping the alarm bells which tell us that a fire is broken out. We should be attending to the fire and let the bells ring. The swelling on the man's knee might not, it seems, be a disorder in itself, but only the outward expression of a real trouble existing within—a warning given by nature, and perhaps an outlet, which, if encouraged rather than restrained, might do much to alleviate the disorder of which it is the expression.

He does not believe in giving drugs and medicines of any kind—he does not refer to simples—save in extreme cases, because their use puts an extra tax on the strength of the patient, who, after recovering from the original malady, must also recover from the effects of the foreign substances that have been taken into the body or injected under the skin.

A man, woman, or child who will take a fair proportion of fresh air and exercise daily will not fail to be benefited in health. The effects of fresh air and exercise, when taken continually, would seem exaggerated if set down here—let those who may be interested inquire at the nearest gymnasium.

McClellan, the boxing-master at Woods' Gymnasium, in New York city, said recently to the writer: "The doctors couldn't do anything for Mr. ——— (once a confirmed invalid). I took hold of him, made him box with me; a very little at first, increasing the amount of the exercise as the weeks went by, until now he is quite recovered, goes to his office every day, and walks up and down town in all weathers. He eats well and sleeps well—it all came along of the boxing."

This man used to be surrounded by bottles containing medicine, like an apothecary's clerk in a compounding room. He took something out of one bottle when he got out of bed in the morning, and helped himself from others before and after each meal. The more medicine he took the feebler he appeared. One malady seemed only to pave the way for another, ache followed ache, what brought relief to one ailment added to the intensity of another, and he soon found that thus to seek for health by way of the materia medica was, like the first inhabitants of Arcadia, to chase the sun, which, when they had reached the hill on which it seemed to rest, was still beheld at the same distance from them.

It is not intended to cast a reflection upon those estimable and skillful physicians to be found to-day in almost every community, who are quick to recognize symptoms, adroit in lessening pain, and with whom the saving of life is a common incident. But many, perhaps it is safe to say most physicians, do little to encourage the ailing to rely upon their own exertions for relief, rather than upon medicines, which at best can afford but a temporary respite from suffering and disease.

A New Railroad Signal.

Elsewhere in this issue we illustrate and describe a railroad signaling device which contains a number of elements for safety that render it deserving of special attention. At the end of each section is a clock, which shows the exact time of the passing of the preceding train.

The opening of either a drawbridge or switch automatically places a danger signal before the face of the clock. This signal cannot be removed except by the closing of the draw or switch. Should the line become blocked, the danger signal can be displayed to warn approaching trains by a trainman pulling a wire extending along the side of the track.

These and other safety operations are performed by simple mechanical devices.

Beautifying the Skin.

The *Southern California Practitioner* tells us that in the work on diseases of the skin edited by Professor Von Ziemssen, Dr. Heinreich Auspitz, of Vienna, makes the following observations upon this subject:

1. A healthy integument is not necessarily beautiful. Even if all requirements concerning diet, residence, atmospheric and climatic conditions, etc., are carried out, the complexion is often extremely bad. The general condition of health has no influence upon the beauty of the complexion, though it has upon the health of the skin.

2. Cleanliness is a *sine qua non* of the beauty of the complexion, though it does not play a great part in the health of the skin.

3. Water is serviceable to the skin in only moderate amounts and at moderate temperatures. Very cold or warm baths, when used to excess, diminish the elasticity of the skin and its power of resistance to external irritatants.

4. Distilled and so-called soft water are more suitable for washing, and less irritating than hard water.

5. The hard soda soaps are usually preferable to the soft potash soaps for toilet purposes. The quality of soaps depends upon the quality of their constituents and the thoroughness of their saponification. Good soaps must not contain free alkali or any foreign irritating substance. The addition of moderate quantities of perfumes does not materially change the quality.

6. Simple, finely ground powders, such as starch, magnesia, etc., are entirely innocuous, and often act as a useful protection against external irritants.

7. Frequent application of alcohol abstracts the water of the skin, makes it dry and brittle, and impairs its nutrition. This is also true of glycerine. All toilet washes containing alcohol to any considerable extent should be avoided.

8. This is true to a still greater extent of other additions to washes, such as corrosive sublimate, mineral acids, certain metallic salts, etc.

9. Camphor acts merely as a bleaching powder. This is also true of benzoic resin, sulphur flowers, and substances containing tannic acid.

10. The use of sweet-smelling oils and fats should be employed to a greater extent than is now done for toilet purposes.

11. This is particularly true with regard to the growth of the hair. The nutrition of the scalp should be increased by the rational application of fat (for example in the form of oil baths, by means of the application at night of a sponge soaked in oil upon the scalp) and the greater use of simple pomades. These should be applied to the roots of the hair, rather than the shafts.

12. Substances should be avoided, or sparingly used, which abstract water from the skin and the roots of the hair.

Prevention of Accidents.

The whole tendency of modern industrial progress is in the direction of abolishing manual labor in manufactures, and substituting for it machinery, which is being constantly improved, and which in the not distant future may be expected to reach still higher stages of perfection. The result of this change in the methods of production, of course, necessitates the use of considerable power, and the rapid movements of belting and gearing expose workmen to dangers to which in earlier times they were not liable. In this country the legislature has for a long time shown that it considered employers of labor to have duties to perform in seeing that those in their pay should run no unnecessary risks. In France, however, no attempt was made to deal with this matter until 1874, when inspectors were appointed with power to order changes in factories, with a view to the protection of children. This, however, was found insufficient, and in 1884 a law was passed making the employer responsible for accidents, except in cases where he could prove that they were due to carelessness on the part of the workman.

In addition to this, to provide for that class of risk which may be described as inseparable from the trade, compulsory insurance has to be effected, one-half of the premium for which has to be paid by the employer and the remainder by the workman. A further proposal is now made to improve the sanitary arrangements of workshops, as well as to bring about increased safety. In Germany and Austria similar enactments are in force. In France, however, a useful initiative has been taken by certain unions, in which are representatives of all kinds of industries, who have inspectors of their own, and who form a kind of council, at which full consideration can be given to the best means of preventing accidents. Thus, the engineers of one association have taken, one by one, all machines of a dangerous character, and entered minutely into the best means to be adopted for rendering them safe as far as possible. These proceedings have proved very beneficial, and have not only had a local effect, but the recommendations have been adopted in surrounding districts. The idea is one worthy of notice, as tending to prevent over-legislation, which not infrequently has a harassing influence upon business.

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The Maxim Automatic Machine Gun Works.

The friends of H. S. Maxim, who acquired considerable of a reputation in electric lighting appliances, when residing in this country, will be glad to know of his success in London with an automatic machine gun of his invention. The *Mechanical World*, of London, describes Mr. Maxim's experimental works: This factory, which is situated at 57D Hatton Garden, London, has been started solely for the purpose of carrying out experiments with the automatic machine guns of Mr. Maxim. It will be readily understood that an invention of this nature, with its endless applications, would necessitate a large amount of trial work in perfecting and improving it. The works, although of the nature described, are of considerable extent, occupying five floors, and employing some 45 hands, besides eight draughtsmen engaged in designing the numerous patterns of machine guns to be made. These works are devoted entirely to the prosecution of experiments in connection with the application of automatic firing mechanism to all sorts of weapons, from a pistol to a cannon, on the Maxim system. It is not, therefore, in any sense a manufacturing establishment. But once the work of experimenting, now lasting over three years, has been sufficiently completed, guns of various patterns will forthwith be manufactured on a large scale. Several large orders, we understand, await execution, and doubtless the demand for them is likely to be considerable.

On the ground floor of the building are a number of the ordinary tools common to an engineering establishment, including a small planing machine, three lathes, a milling and drilling machine, etc. On the first floor are some larger tools, such as a fair sized planing and slotting machine, a shaping machine, a pattern maker's lathe, a smith's forge, emery wheels, etc. In the large lathe here at the time of our visit there was being turned up the outside brass casing of a three pounder gun. There was also to be seen several other guns, some in progress and others finished. The guns now being made are a great improvement on the one Mr. Maxim had at the Inventions Exhibition, both as to simplicity of mechanism and weight.* The gun in question fired over 600 shots per minute. We had the opportunity of firing a small gun weighing 32 pounds, whose rate of fire is 600 shots per minute, and certainly nothing could well be simpler than the handling of it. It has already fired 20,000 rounds without a single failure. A Nordenfelt gun, to fire the same number of shots per minute, we were informed, would weigh 100 pounds more, and a Gardner gun of the same shooting power would be some 428 pounds heavier. These latter have also to be mounted on much heavier stands, which adds greatly to their cost.

In firing the Maxim machine gun, the barrel is kept cool by the circulation of cold water, which enables a large number of shots to be fired at a time. A pint of water for every 1,000 cartridges is about the quantity required to absorb the heat evolved. Here may be seen the smallest machine gun ever made—a military automatic repeating rifle, carrying a magazine of ten cartridges, which it will fire at the rate of ten in 2½ seconds. It has the external appearance of an ordinary gun. As to size, the Winchester repeating rifle, which has for many years been regarded as the standard magazine gun, when full cocked presents a body four times the length of the cartridge and a depth equal to one length of cartridge, while the Maxim machine gun has a body only 2½ times the length of the cartridge and a depth of three-quarters the length of cartridge. The shoe, or body, of this rifle carries the mechanism.

Drawings are in hand of a 100 pounder gun, about to be made. It will fire a shot of 100 pounds with a powder charge of 50 pounds, at the rate of 25 per minute.

Another machine gun of a somewhat different type, which we saw, deserves mention. It is intended to give a scattering fire with a very heavy charge of powder. The projectile is made in a peculiar manner, so that when four small cuts are made on the surface of the bullet by cutters in passing out of the muzzle it flies into 19 distinct pieces, which are scattered in all directions. It is capable of discharging these missiles at the rate of 3,000 per minute, and is intended for long range firing, capable of penetrating the shields of any machine guns, and will be able also to cope with ordinary field artillery. This gun will in every way be a very formidable weapon.

In the drawing office there is a field machine gun mounted on wheels, which serve not only to transport it from place to place, but are so arranged as to swivel round, so that the forward edge of the wheels converge toward each other and close up to the front shield, forming a complete protection for the gunner.

The whole machine is extremely light, compact, and easily handled. The wheels are made of slightly dished steel plates cut to the desired diameter, having a rim of angle iron riveted to their circumferences.

On the top floor of the building are to be found a number of machines for light work: Four lathes, three shaping machines, two drilling and one milling machine; also two profiling machines, a gas forge, a small muffle furnace, grinding and polishing machines. In fact, there is a very complete equipment of tools for producing accurate and well finished weapons. An interesting machine in operation in one of the workrooms is a very ingenious piece of mechanism, the invention of Mr. Maxim. Its purpose is to make the carrying belts for the cartridges. These belts are made from double strips of stout cloth, spaced off to suit the size of cartridge for the particular gun. The spaces are portioned off by the machine and a thin brass plate placed on both sides of the band at regular intervals, and then fastened together by three eyelets in the width. The machine punctures the cloth without cutting the fiber, by the passage of three tooth-like projections, which carry the eyelets. These are next riveted over and hold the cloth firmly. One man works the machine, which completes each operation separately and, it may be said, automatically. These machines, when in regular work, will be attended to by girls.

The guns to be seen here are extremely interesting from a mechanical point of view, as well as the process of manufacture and the tools employed. The Maxim machine gun is bound to play a very important part in future military operations, and will probably greatly alter the condition of machine gun warfare. When the various patterns and sizes have been fully and finally determined upon, their manufacture on a large scale will be proceeded with at once.

Mr. Maxim has in his office a number of fine photographs of his various guns, also some parcels of cartridges which had been fired from the Maxim gun by distinguished personages, among whom were the Prince of Wales, the Marquis of Lorne, Lord Alcester, Lady Bramwell, and others.

* See SCIENTIFIC AMERICAN SUPPLEMENT, No. 494, for illustration of Maxim's, Nordenfelt, Gardner's, and a number of other machine guns displayed at the exhibition.

A Great Negative.

In the early part of June of the current year, the news was wired from Boston to all parts of the country that a local photographer, Mr. T. R. Burnham, had produced the largest dry plate negative ever attempted, the success being in every respect complete. As a natural consequence, the author of the big picture was quickly sought out, interviewed, and questioned, and experts very soon discovered that it was not a mere sensational report, but an accomplished fact. There was the huge negative, representing a life-size three-quarter length portrait of a young lady, and measuring 3 by 5 feet—36 by 60 inches. The weight was over eighty pounds, the thickness of the glass about half an inch. The plate was coated expressly for the occasion by Messrs. Allen & Rowell, of Boston, professional photographers of high standing, and manufacturers of an excellent brand of dry plates, who declare that the task imposed upon them was a most difficult one, as can well be imagined. And the amount of labor required in developing the huge plate was something they had not anticipated, and are not anxious to experience again. The trays had to be specially made, and the quantity of developing solution is said to have been over three pailfuls. Everything connected with the undertaking had to be done on a large scale. The camera, though not a model of compactness, such as fastidious amateurs dream about, was homemade, and constructed by Mr. Burnham himself, the lens used on it being a No. 8 euryscope, the largest of that class made.

The upright focusing screen consists of two lights of ground glass divided by a bar running across, similar to a window, the height being such as to necessitate the use of a pair of steps in focusing the image. Thus the "largest camera in America," furnished by a well-known manufacturer to a Boston amateur, and which accommodates a 24 by 36 plate, is effectually eclipsed. As to the picture itself, which was exhibited at the St. Louis Convention, and seen to advantage by admiring groups of photographers, nothing short of sincere praise can be bestowed upon it. Made with Voigtlander's euryscope No. 8, in twenty seconds, and fully timed, it possesses all the merits of a first-rate photograph, notwithstanding its huge proportions. The definition is adequately clear and surprisingly even all over, showing how skillfully the focus was divided—the most important factor in the production of large pictures, whether heads, figures, or groups, and in which particular many photographers fail, in spite of the excellence of the instrument employed. The most gratifying feature of the print, however, is the illumination, which is brilliant, searching, and almost phenomenally uniform, extending, as it does, to the very edges, showing, too, that the covering capacity of the lens was not taxed in the least, and that even a larger picture could be produced under similar conditions. Then, too, the lens in its original form was used, and not one of the combinations, as has been intimated by some biased or inexperienced critic. Had this been the case, it is very doubtful if the feat could have been accomplished, as two very serious obstacles would have presented themselves, namely, the doubling of the focus and the doubling of the time of exposure. The negative was printed in the usual way on a single sheet of Morgan's albumen paper, 36 by 60. In producing this picture, Mr. Burnham was actuated by a desire merely to illustrate the undiscovered powers of the instrument, at the same time to put to flight the occasional "photographer of experience," who claims that the same sized lens fails to cover a 20 × 24 plate satisfactorily! The proof to the contrary in this instance is a most convincing one, and must be of enduring benefit to those gentlemen who are identified with the use or sale of these favorite and powerful lenses. Last, but not least, is the artist himself. It is greatly to his credit that, in spite of the appeals of his friends to desist from so "foolish" an attempt, and the failures and expense staring him in the face, he manfully persevered, quietly making his preparations at considerable cost, and then suddenly announcing to the world his unequivocal success.

Mr. Burnham was justly awarded one of the Association's special silver medals for his remarkable production, which required a rare combination of enterprise, pluck, and skill. The negative is at his studio in Boston, as well as one of the direct prints.

The Mechanic Arts of Cornell.

Cornell University, as the readers of the SCIENTIFIC AMERICAN learned last year, through the very fully illustrated description of that institution and of Sibley College, its college of mechanical engineering and the mechanic arts, given in our issue of Oct. 7, 1885, has, of late, been evincing a very strong determination on the part of its governing boards to carry out effectively the provisions of the law and the charter on which it is founded by making very complete arrangements for the prosecution of its "leading" work, the promotion of learning in the direction of the useful arts. The result is reported to be gratifying beyond all anticipations.

The University shares more than fully in the prosperity of the colleges of the country generally, and has now nearly 800 undergraduate students, with the prospect of rounding the full figure before the influx ceases for the year. The freshman class contains above 300 men, and is probably the largest that ever entered an American college. The roll of higher classmen and of graduate students pursuing postgraduate studies is also reported to be extraordinarily increased. The faculty have made unusual efforts to provide strong courses for such advanced work.

It is especially gratifying to all who are interested in the current changes in the direction of improved technical education to learn that the technical courses are found even more attractive than the academic. The classes entering the Sibley College courses in engineering constitute about one-third of the new class, and the technical departments, all together, receive about one-half of all the new men. How much of this unexampled growth of Sibley College and allied departments of the university is due to the extraordinary facilities provided and promised by the trustees, how much to the form of organization and methods of administration perfected by the director, and how much to the very thorough manner in which the public has been advised of what was in progress, as, for illustration, through the columns of the SCIENTIFIC AMERICAN, no one can say; but we hope, at least, that we may claim some share in what is certainly a most gratifying progress in technical education.

It is said that our views of the buildings of Sibley College, if not of the University buildings, will probably not be correct for another year. The present structures are overcrowded, and the woodworking shop, if not the whole establishment, must probably be doubled in its capacity, if they are to accommodate comfortably the coming classes. The country is evidently entering upon an era of extraordinary prosperity, and our colleges are among the first to present proofs of the change. We may probably expect a continuance of this tendency of young men to want practical as well as disciplinary studies. It may, indeed, be well doubted whether we are not just entering upon a new period of advancement in all educational work.

The Recent Eclipse of the Sun.

At Grenada, August 29, during the solar eclipse of that morning, good photometric observations were made by Prof. Thorpe. The light during the middle of totality was less than from the full moon. The eclipse was well observed by the British Astronomical Expedition, and in the observations taken it was noticed that the corona extended nearly two diameters from the sun, and exhibited a feathery structure at the poles. Good photographs have been obtained of the coronal spectrum in the blue end. The spectrum was similar to that of the eclipse of 1883, observed on the Caroline Islands.

THE receipts of the Patent Office for the year 1885 exceeded the expenditures over $163,710, while the balance on hand January 1, 1886, was $2,945,405.58; and yet the Commissioner of Patents cannot get Congress to appropriate a sufficient sum out of the surplus patent fund to enable him to employ a sufficient examining force to keep up the work of the office. It does seem as if the majority of our legislators fail to realize the importance our Patent Bureau is to the country.

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