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(Illustrated articles are marked with an asterisk.)

THE PROTECTION OF PROPERTY.

It is an old proverb that "God helps those who help themselves." It might be said also that even at this late day the administration of justice remains so imperfect that the law helps only those who help themselves, so far as the protection of property is concerned. Even in countries where police duty is confessedly performed in the most efficient manner, and where a thief caught, is as a rule a thief condemned and punished, citizens feel it necessary to supplement the arm of the law by all the means in their power.

No departments of mechanical art have given birth to more numerous devices, or combined in a greater degree ingenuity and constructive skill than those whose products are designed for the protection of property against thieves and fire, these being the principal enemies which are to be combated on land.

In the invention of locks there has been displayed a vast amount of study, thought, and ingenuity. All departments of science have been drawn upon to prevent thieves from withdrawing bolts that have been shot; and one of the latest and most ingenious of these applications is that of magnetism, the subtile influence of which has enabled the combination lock, hitherto not inaccessible, to defy the most expert picklocks.

The ingenuity of honest men has been taxed to the utmost to circumvent the opposing ingenuity of rogues; for it is nearly always the case that when some improvement stops these gentry for a time, they learn to surmount it, and the minds of inventors are again taxed to create new obstacles.

A great deal of skill and talent has also been expended in the attempt to render walls as well as locks burglar proof; and as it was found practically impossible to do this on a large scale at a price within the means of ordinary persons, the practice of building burglar-proof boxes or safes, was introduced at a very early period in the history of the world. Constant improvement has been requisite in the construction of these safes, as the resources of burglars have nearly kept pace with those of the safe builders. They have, however, at least, been partially brought to bay before chrome iron, chilled iron, and steel; how long they will remain so remains to be demonstrated.

In fire proof safes the problem is how to combat a fierce, but blind, unreasoning force, limited in its operation, and the effects of which are well known and understood. Much success has been reached in the construction of safes which will resist the action of fire for a long time. Of these the most successful have been those which do not depend merely upon the non-conductivity of some substance to protect the contents from the action of external heat, but upon the power of steam to absorb and rapidly convey away heat. The water is generally inclosed between the external and internal walls of safes in the form of "water of crystallization" in some salt, alum being by far the best for this purpose, as it contains a very large percentage of water.

When the crystals of this salt become heated they give off the "water of crystallization" gradually, and it is converted into steam at 212°. So long as this steam is generated the contents of the safe cannot be injured as the temperature therein can not rise higher than 212°, no matter how great the external heat may be. Water has also been inclosed in tubes with plugs fusible at a low temperature, which, melting as the heat rises, allow steam to fill the safe.

A vast number of inventions based on the above principle or upon others less reliable, have been made and patented, many of which have had their day, but some of which remain deservedly popular.

How immense the distance also from the old fire syringes and buckets of medieval times to the superb and powerful steam fire engines of the present. How the "devouring element" must have laughed at those insignificant squirt-guns, in their impotent efforts to subdue it.

The last ten years have given birth to two important additional means of security, namely, the Burglar Alarm Telegraph, and Safe Deposit Companies.

Our readers are well informed in regard to the ingenious application of electro-magnetism, to the giving warning against the entrance of burglars through doors and windows. The principle is capable of extension, so that if, through neglect in setting the instrument, or by the superior art of the burglar, entrance should be effected, he could not pass about a building without giving notice of his presence.

The Safe Deposit Companies afford facilities to people about to absent themselves from their residences, for the security of valuables while they are absent, and also for the safe keeping of valuables at any time. They were called into existence by a necessity, which, as it must in the nature of things be permanent, will afford them a permanent support.

The time is probably far distant when any or all the means employed for the protection of property from robbers will avail to give perfect immunity from their encroachments; still, with those now employed their profession would be rendered a most hazardous one, were the administration of justice as perfect as the mechanical devices intended to protect property from such marauders.

REPORT OF THE REGENTS OF THE SMITHSONIAN INSTITUTE.

The report of the Secretary, Professor Henry, states that at the last session of the board it was resolved to memorialize Congress, asking that the usual appropriation of $4,000 for the maintenance of the National Museum might be increased to $10,000, and also that $25,000 might be appropriated towards fitting up the large room, in the second story of the building, for the better exhibition of the Government collections. The request was refused and only the usual appropriation was made.

In view of the facts that $4,000 was the sum appropriated when the museum was under the charge of the Patent Office, that since its removal to the Institution its size has been trebled, that the currency is greatly depreciated, and that the amount expended since the fire of 1865, is over $140,000, the greater part of which was for the accommodation of the National Museum, it is hard to see why, if the sustaining of this museum is considered necessary, the moderate request of the Regents should not have been granted.

The fact that $20,000 of the $140,000 expended since 1865, were paid out of the last annual income, renders the results attained during the year particularly praise-worthy.

The funds of the institution are reported in better condition than they were at the time of the preceding report by $18,000. The total capital of the Institution after payment of all liabilities is $697,000, a gain upon the original bequest of Mr. Smithson of over $155,000.

The fifteenth volume of the "Smithsonian Contributions to Knowledge" has been published and distributed to institutions of learning in this country and in Europe. A large number of valuable and interesting papers are in hand, and will form parts of the sixteenth volume of the same publication.

The general appendix to this report contains a large amount of valuable scientific matter, together with biographic sketches of scientific men. These latter comprise a memoir of Cuvier, with a history of his works; a memoir of Oersted; a notice of Christian Frederic Schoenbein, the discoverer of ozone, with an appendix giving an account of the principal discoveries of that distinguished investigator; a memoir of Encke; and a memoir of Eaton Hodgkinson, the celebrated English engineer, with reviews of many of his inquiries and demonstrations.

These are followed by a translation of a very important paper on "Recent Progress in relation to the Theory of Heat," by A. Cazin, and another one from the pen of Dr. Joh. Müller on the "Principles of the Mechanical Theory of Heat," with a large number of illustrations, the execution of which fully entitles their perpetrator himself to execution. The subject matter, however, of this paper, and the thoroughness and perspicuity with which it is treated, render it one of the most valuable works upon heat ever published in English.

The next contribution in order is a short but valuable paper on the "Continuous Vibratory Movement of all Matter, Ponderable and Imponderable," by L. Magrini, of the Museum of Florence. In this paper the attempt is made to prove that *movement is a fundamental property of matter* in whatsoever state it exists, that the movement always has existed, and, though the author does not draw this inevitable and logical conclusion from his argument, *always will exist* so long as matter exists. We may at some future period review this paper at length

We are next given a lecture by Dr. John Tyndall before the University of Cambridge, May 16, 1865, on the subject of Radiation, of which, having given the author's name, it is unnecessary for us to say it is a comprehensive and exhaustive discussion, exhibiting in a marked degree the peculiarly felicitous style characteristic of Mr. Tyndall's efforts.

The remainder of the volume is filled with records of scientific experiments, reports of learned societies in various parts of the world, archæological discoveries, etc., etc.; the whole making a volume which the Secretary might justly hope "would show the results attained to have been little inferior in value or extent to those of any preceding year."

THE RATIONAL CONSTRUCTION OF HOSPITALS.

We have been greatly interested in a correspondence which has been going on in the columns of the *Scotsman*, in reference to building the new Royal Infirmary at Edinburgh.

The parties to this discussion are Professor Syme, and Sir James Y. Simpson.

Mr. Syme is in favor of a large building, placing the utmost reliance in disinfectants for preventing the spread of disease, and those evils to which all such institutions are occasionally liable. The disinfectant upon which he chiefly relies is carbolic acid; but Sir James Y. Simpson denies its efficacy. The latter states that during the two years in which it has been employed the mortality from amputation has increased from forty to fifty-three per cent.

Instead of the large buildings hitherto employed as hospitals, with their numerous wards, bedrooms, etc., he advocates a central building for the administrative part of such an institution, and the erecting upon the ground around about this central building a series of village hospitals or wards, furnished with the latest and best sanitary improvements.

He claims that in the construction of such buildings the great disinfectants and antiseptics that we should alone depend on are abundance of space, abundance of light, and above all, abundance of fresh, pure, and ever-changing air to every patient in every ward. He is right. During the recent war we saw an admirable test of the correctness of his views. It was our privilege to contrast daily for a long period, the sanitary condition of patients crowded together in a large hospital, and others distributed in smaller buildings at considerable distance from the main hospital, used to supplement the accommodations of the larger building.

The increased comfort, and the improvement in the condition of the patients in these smaller wards were so marked as to attract the attention of, and elicit considerable remark from the surgeons in charge.

The huddling of people together, even when all are healthy, is attended with increased liability to disease. How much must such liabilities become exaggerated when the air is loaded with foul effluvia and exhalations, sickening even to healthy attendants, and which together form an odor characteristic of every hospital we ever entered.

Best of all restoratives are light, pure air, and rest, such as never can be secured to patients crowded together in large wards and forced oftentimes to witness involuntarily sights which, to those not inured by long familiarity with suffering and disease, are harrowing in the extreme.

We believe that were the suggestions of Sir James Y. Simpson adopted, a great benefit would be conferred upon suffering humanity.

SOLAR SPOTS.

If any of our readers had provided themselves with a piece of smoked glass during any of the bright days which were so plentiful during the middle of last April, they might have seen through it a group of remarkable spots on the sun's disk. These spots have been observable more or less during the entire summer. On the fourth of September five of these spots reappeared, after a short period during which the sun was almost wholly free from spots. Two of these spots were of very great size, the entire surface covered by these and other smaller spots being more than one fifth the sun's diameter.

These spots are of frequent occurrence, and although they cannot always be detected by the naked eye, there are few intervals when they cannot be detected with a telescope. We should not have felt called upon to say much about these spots at this time were it not for the fact that we are approaching a period when they are to be expected in greater numbers than at ordinary times. Mr. W. T. Lynn, of the Royal Observatory at Greenwich, England, says all things indicate that we are rapidly approaching a period of maximum of abundance and frequency of the solar spots. He estimates the most probable length of the interval between two consecutive maxima, as one ninth of a century, or eleven years and one month; this would bring us to another maximum in the course of the year after next, 1871, probably about the middle or towards the end of it.

As the period of the sun's rotation on its axis is 25·34 days, and its apparent revolution is 27·3 days in consequence of the change in the position of the earth during a rotation of the sun, the time for the reappearance of spots after having passed behind the western limit of the sun, unless they should be dispersed before his semi-rotation is completed, may be readily computed.

The April spots, or rather the spot, as although there were five distinct nuclei observed they were included in one penumbra, were estimated on the 13th of that month as being 55,000 miles in length, and 30,000 in breadth, covering an area of about 150,000 square miles.

Recent observations seem to put beyond all question that there is an intimate connection between disturbances in the sun's photosphere (light-sphere) and meteorological conditions of the earth's atmosphere. Some of these observations have found a record in the late volumes of this journal, and our readers will recollect them perfectly, particularly an article entitled "Storms in the Sun," published on page 139, current volume.

It is no wonder then that all solar phenomena should at the present time be of the most absorbing interest. We are probably on the eve of remarkable discoveries. The spectroscope is, in the hands of able investigators, throwing light on much that has been hitherto mysterious, and opening new avenues of research, the future of which it is impossible to predict.

Two hypotheses have hitherto been entertained in regard to the nature of the solar spots. The first is, that the vaporous