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(Illustrated articles are marked with an asterisk.)

To Advertisers.

The circulation of the SCIENTIFIC AMERICAN is from 25,000 to 30,000 copies per week larger than any other journal of the same class in the world. Indeed, there are but few papers whose weekly circulation equals that of the SCIENTIFIC AMERICAN, which establishes the fact now generally well known, that this journal is one of the very best advertising mediums in the country.

IMPROVED WEAPONS IN EUROPEAN WARFARE.

The busy, progressive, unresting brain of the nineteenth century is pressing into its service all the powers of nature for the purpose of ameliorating the condition of mankind. It has made the ocean its highway, electricity its messenger, and fire and water its willing slaves. Chemical and physical forces have been, so far, compelled to bear the burden of the primeval curse that, were it not for the ever-increasing desires and artificial wants of man, it could hardly be said that he is compelled to eat his bread in the sweat of his face. Aside from the pleasure that is experienced in triumphing over difficulties; the sense of power which is felt in subduing the forces of nature, which makes inventing, to a certain class of minds, the most fascinating of pursuits, the pecuniary results of any successful and useful invention, in days when all are making haste to be rich, are so tempting that inventive genius everywhere is called into untiring, ceaseless activity.

Well would it be for the human race, were our civilization sufficiently advanced, so that this inventive genius, almost omnipotent for good, should never be called into play for the purposes of evil. But a power for good is always a power for harm. The same class of brain, which, if benevolently directed, ameliorates, saves, and blesses, may curse, kill, and destroy. The same faculties that have given us the telegraph, the railroad, the steamship, the mower and reaper, the sowing machine, the printing press, the sun picture, in short, devices innumerable for our comfort and happiness, have also given us engines of destruction which more than rival the thunderbolts of heaven, and which are scarcely exceeded by the earthquake and the volcano.

Now, when the vast armies of two of the great European powers stand confronting each other, and the civilized world is awaiting with breathless anxiety the shock which will be felt throughout Christendom, one shudders to contemplate the terrible means of mutual destruction, almost mutual annihilation, in the possession of both parties. Our own recent terriffic civil war called into play American inventive genius to an extent and with a success which astonished the world. Artillery of unprecedented range and power, projectiles of apparently irresistible force and unlimited destructiveness, were met by contrivances for defense almost impregnable. Strategy, traditional military method, personal courage, individual prowess, all that had, in former times most largely contributed to the success or defeat of armies, occupied but a secondary place when compared with mechanical ingenuity in constructing appliances of attack or defense.

The *Merrimac*, which, in her iron armor, could defy and destroy almost our whole wooden navy combined, was disabled by the little nondescript looking *Monitor*, and, from that moment, the existing navies of the world were obsolete. It was a struggle on the one hand to make irresistible ordnance and projectiles, and on the other to construct impenetrable armor for vessels on the water and impregnable fortifications on land. Shot that almost reminded one of the mountains hurled by the combatants in Milton's war of the celestial powers, glanced harmless from plates of steel, or imbedded themselves in yielding but still obstinate earth-works. And yet, the improvements in cannon and their projectiles are really not half so important as modern advances in small arms. The invention of the hollow-based conical bullet so fearfully effective in the Crimea, in the war between Russia and the allies, and which, fired from the Springfield rifled musket, was in most general use in our army, and above all, the introduction and perfection of the breech-loading carbine or rifle, have worked, or are working, as great changes in military operations on land as iron armor has wrought in naval warfare. Napoleon I. is said to have asserted that "Providence was on the side of the heaviest battalions," but in modern warfare, not to speak irreverently, Providence is likely to be, as it was at Sadowa, on the side of the best small arms. In that remarkable and decisive battle, it will be recollected that the Austrians, with their comparatively ineffective weapons, were completely at the mercy of the Prussians, with their fearful needle gun, and, although we have mysterious hints about certain terrible agencies which are to be brought into play in the coming struggle by the wily French Emperor, yet it is altogether probable that the relative efficiency of the small arms of the contending powers will be really the important and most decisive element in the contest.

It is the fearful *Chassepot* against the terrible *Zündnadelgewehr*. It is to be the first great contest in which both contending armies are provided with breech-loading weapons. At Sadowa the needle gun, and at Mentana the chassepot wrought unpecedented destruction, but these weapons were not opposed by those of a similar character. In our civil war, only a comparatively small portion of the troops were armed with breech-loaders, and, as we have said, the principal small arm was the Springfield rifled musket, which was confronted on the part of the Confederates by the Enfield rifle, or by a weapon of nearly the same make as ours. But now armies of immense numbers and perfect discipline, wielding the most destructive of all weapons, the breech-loading rifle are to confront and do battle with each other. What is to be the result? It is not possible to foretell. If the battle should be tried, as of old, "man to man and steel to steel," if there is to be anything like "square, stand-up fighting," the result must be speedy victory to one side, or annihilation to both.

On the side of the French, it is said the *Mitrailleuses*, or *les filles du commandant*, as they have been sportively called, are to play an important part. It is stated, that recently three hundred horses, bought from a "knacker," for a few francs each, for the purpose of the experiment, were killed by two of these weapons in three minutes, and that, subsequently, five hundred horses were destroyed with still greater rapidity. It is quite possible that there may be something sensational about these reports, as with regard to other marvelously destructive devices, the possession of which is darkly shadowed forth by report and rumor as in possession of the French, and to be operated in the coming contest. But about the small arm there can be no doubt. Although, in the opinion of experts, neither the chassepot nor the needle gun is in any way superior, if equal to our best breech-loaders, yet both theory and experiment have demonstrated them to be so murderous in their effects, that protracted open-field fighting between armies provided with these weapons is impossible. It must, as we have said, either terminate speedily or annihilate both. Yet it is questionable whether this will really tend to shorten the war itself. One of the most striking practical results of the use of the breech-loader is the advantage thereby given to the defensive in military operations. The advantage of the initiative, the offensive, the sudden dash, the brilliant charge, is gone, and gone forever, between troops at all equally matched in numbers and *morale*. With breech-loaders, well-drilled soldiers can load and fire in any position—as well lying flat upon the ground as in any other. The soldier, in working his piece, is not compelled, as with the old muzzle loader, to elevate or expose his arms, and without in the least checking the rapidity or impairing the efficiency of his fire, he can place himself so as to be covered by any slight advantage which the ground may offer; or, if not covered at all, by lying flat upon the ground and only elevating his head sufficiently to sight his piece, he is very little exposed as compared with one who is delivering his fire from a standing position. These points are of immense advantage, not only in skirmishing, but in fighting on the defensive in line of battle. But suppose both parties to fight without cover, to stand up and give and take. The defensive, standing firm, has decidedly the best of it over the offensive, advancing to attack, in steadiness and accuracy, as well as rapidity of fire, and it may be laid down as impossible for any body of troops, no matter how courageous or well disciplined, to advance directly upon and under the fire of a line of battle, armed with breech-loaders, and delivering, at short range, steadily and accurately, ten, eight, or even six discharges per man per minute. But this is not all. A very slight intrenchment, a breastwork such as our troops in the Army of the Potomac used frequently to construct in an hour, suffices completely to cover a line of battle, and to render it, as far as any attack by the front is concerned, invincible. Even with the Springfield or Enfield muzzle-loading rifle and conical bullet, this was nearly the case with the armies of both sides, in our civil war. Two hours' time, with intrenching tools, rendered the defensive as good as an odds of three to two, or two to one. But with the breech-loader, discharged from a rest, under the cover of an intrenchment, and with the steadiness and confidence which troops feel under such circumstances, a very slight intrenchment is, as against troops advancing, and, of course, entirely exposed, absolutely impregnable. It was this, though to a less extent, with our muzzle-loading arms, which rendered many of our most sanguinary conflicts so indecisive. Unless the worsted party was completely routed, and at once, a skillful retreat of a few miles, a judiciously chosen position, and a very few hours' work, and the apparently defeated force stood like a rock. From all this, it would seem by no means impossible that the destructiveness of modern arms, which would appear, at first, calculated to make the present war in Europe "short, sharp, and decisive," may really prolong the conflict. The saber, the bayonet, the solid assaulting column of infantry, the thundering charge of masses of cavalry can no more succeed against implements of modern warfare, than the spears, the shields, and the solid squares of the old Greek phalanx.

It may take the warring forces a few months to learn fully all the lessons taught by the breech loading rifle, but it seems not impossible that, unless the contest is decided by one or two murderous engagements, as at Sadowa—which is scarcely probable—the result may become more a question of resources and endurance than of brief campaigns and brilliant, decisive battles; that we may see magnificent armies confronting each other, in intrenchments, for weeks and months, neither daring to hazard the attack, and that maneuvering for position, cutting off communications, raids upon bases of supplies, etc., may become the order of the day to even a greater extent than with us during our recent war, and thus the conflict may become much more protracted and less sanguinary than has been anticipated.

THE LAW OF COMPENSATION.

All about us is silently working a law by which all life continues, from the tiniest plant to the loftiest forest tree; from the microscopic animalcule up to man himself. This law may be called the law of compensation.

Farmers in certain sections find their wheat destroyed by weevil, or the plum trees by the curculio. They cease to grow wheat and plums. Years pass, and finally some individual concludes to sow an acre or two of wheat, or plant a plum tree. He is surprised to find the weevil and the curculio gone. His neighbors follow his lead, and soon the wheat and plums are restored to their former favor among the crops profitable to the section. The food of the insects being removed, the insects die. By and by they will gradually creep in again from distant sources, and the same result will be experienced.

The husbandman kills off one scourge only to find that some other as bad as the first multiplies to ruin and desolate. The sparrows brought to New York and Brooklyn could not be kept in the parks until the squirrels were removed. The sparrows have done the service they were expected to perform, and have effectually destroyed the disgusting and destructive caterpillars which infested the trees previous to their importation. Now the number of these brisk little chatterers has so increased that they are themselves becoming a nuisance. They roost in large flocks in trees before residences, and cover the walks and fences with filth. It would seem almost necessary to go back to squirrels again in order to diminish the numbers of the sparrows by the destruction of their eggs.

Death is necessary to life. Smellie, in his "Philosophy of Natural History," has attempted to show that the total destruction of any species must ultimately destroy all. The total destruction of life was recently prophesied by an able chemist from the ultimate conversion of all the carbon on earth into carbonate of lime, through natural processes now going on.

It is probable that neither of these authors has taken into account the possible compensations which might prevent the results named. If in the case of the destruction of a species the food of another species were destroyed, and if this latter species could, under impulse of keen hunger, feed upon no other species, and if this were the case with each successive species deprived of food by the destruction of a preceding species, the reasoning would hold good. But such a supposition does violence to our knowledge of the magnificent compensations of nature. The higher we ascend the scale of existence the less we shall find the sustenance of any one species limited to single sources, and the more difficult the conception of its possible extinction. So in the geological changes the earth is destined to undergo, it is quite possible to conceive compensating influences which shall avert the disasters some are fond of predicting. The cycles of nature are so vast, and man in his weakness can see only such a small portion of a cycle, that it seems the hight of rashness to attempt the filling out of the portion we cannot see from the comparatively few cosmological data we have been able to grasp.

The law of compensation is, however, capable of being applied to the benefit of mankind. We have seen how the decrease of one species involves the increase as well as decrease of others. When a rival is destroyed, that which fed upon it loses a portion of food; that upon which it fed has one less destroyer.

We are at present in this country overrun with hosts of destructive insects. Not a flower grows, not a single fruit reaches maturity without attack from these voracious hordes. Horticulturists are sorely perplexed to relieve themselves of these ravages. Relief, if it ever comes, will come by a wise recognition of the law of compensation. Before resolving upon the destruction of any race of animals whose numbers have so increased as to become a nuisance, it should first be known what pest will unexpectedly rise in its place, and to what extent its numbers may be reduced without incurring greater damage than is at present sustained. In this way man, acting intelligently instead of blindly, as heretofore, may so reduce the numbers of such insects as dispute with him for food that they will cease to greatly annoy him. This cannot, however, be done without thorough knowledge of insect life, and it is thus that the science of entomology becomes one of paramount importance to the human race.

Few are prepared to believe that insects devour and destroy

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more vegetation than all other animals, including mankind, do; yet such is undoubtedly the case; and man finds that although he can cope with any of these insects individually, their vast numbers render them formidable enough to often render famine imminent.

But if we remember that not one of these races of insects exists which is not food for some other insect, bird, or animal, we have the clew to the remedy for their ravages. Keep the power of the eaters and the eaten properly balanced, and their mischief will cease to terrify.

SARATOGA SPRINGS.

This popular summer resort seems to have lost none of its prestige, judging from the crowds of people who have visited it during the present season. Its hotels are filled, its numerous springs still flow abundantly, and their waters are eagerly sought for by those who are sick, or imagine themselves so, and those who, being well, desire to remain so.

In our recent visit to this watering-place, although we must confess its attractions are many, and its hotels conducted in model style, we were led to entertain some doubts as to whether more benefit than harm is derived from the profuse and indiscriminate drinking of the water by visitors who are accustomed to hear of the generous rivalry that goes on respecting the virtues of the various springs. The celebrated Congress Spring, though declared to be weak in comparison to former years, still maintains its supremacy, and this famous water can be purchased in London, Paris, Calcutta, and Hong Kong. The Empire Spring sends forth a clear, delicious, and healing water, superior in its medicinal effects upon some diseases to the Congress. The new "Hathorn" is a fine spring, recently discovered, and is already very popular. Since the last year this water has cleared up, and no longer irritates the intestines of its habitual drinkers. The "High Rock," the "Star," and the "Excelsior" are also excellent springs, and deserve to be noticed favorably.

But the greatest natural curiosity among them is what is called the "Geyser" Spring, discovered last winter by the proprietor of a bolt factory directly underneath the center of the building. Noticing traces of mineral water at this point, he caused a boring to be made to the depth of 150 feet, where he struck water in a stratum of bird'seye limestone. This remarkable stream spouts intermittently but rapidly to a hight of twenty feet into the building which has been transformed into a bottling establishment.

An analysis by Professor Chandler shows this water to be particularly rich in mineralingredients. It contains chloride of sodium, chloride of potassium, bromide of sodium, iodide of sodium, fluoride of calcium, bicarbonate of lithia, bicarbonate of soda, bicarbonate of magnesia, bicarbonate of lime, bicarbonate of strontia, bicarbonate of baryta, bicarbonate of of iron, and sulphate of potassa, with traces of phosphate of soda, biborate of soda, alumina, and silica. The water is agreeable to the taste of those who like it. It is a powerful cathartic in its action, and the spring is considered one of the best ever discovered. It takes a long time, however, to obtain a widely extended popularity for any of these springs; hence the waters are always freely given to those who will come for them. Yet, although the waters are free to all comers, he that hath no money, though invited to come, will find no rooms at Saratoga. The hotels are crammed with visitors, and private houses are called into requisition to hold such as the hotels cannot accommodate, the prices visitors are willing to pay being such as to tempt people in moderate circumstances to accept the inconvenience for the sake of gain.

But to go back to the use of the waters by old and young, sick and well, alike. At the mineral springs in various parts of Europe the waters are generally taken under the direction of physicians. In this country few of the frequentors of such places act under advice, but proceed to swill down the waters of first one spring and then of another without regard to quantity or quality or adaptability to their physical condition, apparently going it blind in the hope of being benefited before they get away.

Now this is entirely wrong, these waters are strong solutions of mineral salts, of greater or less therapeutic power, and it is just as rash and senseless to drink them in this manner, as it would be to rush into an apothecary's shop and, shunning all the violently active poisons, to go the rounds of his bottles and jars, taking a sip from one and a pinch from another, without regard to their probable effect.

An instance in point occurred while we were at Saratoga this season. An old gentleman, afflicted with a heart disease, drank in rapid succession some ten or a dozen glasses of the "Washington" spring water, the tonic power of which is well known. His circulation was so accelerated thereby that his heart could not endure the increase of labor demanded, and he fell dead upon the piazza of the hotel.

We have no doubt that, while these waters are of immense value, as remedies for general debility, and various forms of disease, many are injured rather than benefited by their use, simply because they use them without proper discrimination, which can only be obtained through competent medical advice.

NINETY DEGREES IN THE SHADE.

The above expression, with the numeral adjective changed according to circumstances, is very commonly met with, and yet as giving anything but an approximate index to the real temperature of the air it is of little value.

The indefinite character of the phrase creeps in at the last word. Ask almost anybody what they mean by "in the shade," and they will tell you "out of the sunshine."

Now in two different places in this office the thermometer will often vary by a number of degrees when both are out of the sunshine. This variation cannot certainly be attributed to differences in the temperature of the air at the points where the thermometers hang, since there is free and rapid circulation throughout the entire building. Directly opposite the room where the writer now sits is a large brick building, against which the sun shines during the afternoon. The radiation of heat from this building is such that the thermometer will sometimes stand several degrees higher with the shades raised than with them down.

It is evident, therefore, that if the exact temperature of the air be sought, it is not enough to place a thermometer out of the sun. It should be placed in a total heat shadow where it may be read by reflected or diffused light, but be protected, as nearly as may be, from the effect of all heat except that of the air itself.

A common error in regard to thermometers may be mentioned here. It is thought by many that when air is blown over the bulb of a thermometer it will indicate a lower temperature. This notion grows out of the fact that the body feels cooler in a breeze than in still air. The latter result is due solely to the facts that the power of air to convey heat from a body hotter than itself is increased by free circulation, and that evaporation, the great cooler, is also greatly promoted thereby. Neither of these facts apply to the thermometer, since the mercury in the bulb of that instrument, if properly placed, is of the same temperature as the air, and no evaporation, under ordinary circumstances, takes place therefrom. But wet the bulb with water even a degree or two higher in temperature than the mercury; the result will be that after an instant or so the mercury will commence falling, and will mark a lower temperature than that of the air in which it stands. The effect will be still more remarkable if ammonia or ether be used instead of water.

This experiment illustrates the effect of wind upon the thermometer when the bulb is wet. But when the bulb is dry, a precisely reverse effect is produced, although much less in degree. Tyndall shows, in his lectures on heat, that the friction of even the gentlest zephyr upon a fixed body generates a perceptible amount of heat therein. Therefore if air at rest causes a given expansion in the mercury column, when in motion it will cause an increased expansion from the heat generated by friction. Of course this increase is very small. In fact it is less than can be perceived upon the column itself, and can only be determined by the most refined methods. The fact remains, however, that if there be more it cannot be less, which is sufficient for our present purpose.

When we hear of the thermometer standing at one hundred in the shade at any point north of Philadelphia we are always inclined to doubt that the indication is a fair exponent of the temperature for anything more than the immediate vicinity of the instrument. We very much doubt that in any locality on the continent north of the fortieth parallel the thermometer ever indicated one hundred degrees in open air when shielded not only from the sun's rays but from the radiation of surrounding bodies.

THE ACTION OF WATER ON LEAD, TIN, AND COPPER.

Mr. Paul Casamajor, an accomplished chemist in the sugar refinery of Messrs. Havemeyer & Co., has been making some original experiments upon this vexed question which we find published in the *American Chemist*, and the importance of the subject leads us to make an abstract of the results of his researches. The presence of lead in Croton water, after standing in the lead pipes for the night, has been incontestably shown by Professor Chandler. Mr. Casamajor also proves that it is often present in the tin-lined boilers, and accounts for its presence there by the voltaic action resulting from the contact of the lead in the lining, or in the connecting pipes with the copper of the boiler. To prove this he took pieces of lead and copper and put them in contact in two flasks which he left in the dark at the temperatures of 75° Fah. and 150° Fah., for forty hours. In both instances the surface of the lead was corroded, and that metal was found to be in solution in the water. It therefore becomes a serious question what influence the imperfect lining of boilers may exert. It is essential that so much lead is used in their construction, instead of block tin, that every one of them is a galvanic battery, producing more or less lead poisoning. This fact has been overlooked, and while many families have taken the precaution to remove all lead pipes, they have forgotten to inquire into the composition of the kitchen boiler. On this point Mr. Casamajor remarks: "These results leave no doubt on the hurtful effect of exposing drinking water to the simultaneous action of both lead and copper. The effect of an untinned copper boiler must be felt on the cold water as well as on the hot, as all the lead pipes are in communication with the copper boilers by metallic conductors. Whether an untinned copper boiler may not even have an injurious effect on the water of a neighboring house is an inquiry before which we must pause."

The next point to be examined was how far lead and tin react upon each other when placed in contact in water at 75° and 150° Fah. To ascertain this he instituted experiments similar to those previously described.

"At the end of twenty-four hours the flasks were examined and replaced in the dark. The lead in contact with tin was slightly tarnished, while that of the other flask (tin in water alone) remained perfectly bright. At the end of six days the tarnish of the lead in contact with tin persisted, but did not seem to have increased. This is apparently due to this circumstance, that a voltaic couple of tin and lead in aqueduct water is very weak, tin being slightly more positive than lead. Under the influence of the weak current at first produced, the lead, being more electro-negative, becomes slightly oxidized, until the coat of oxide presents such a resistance to further action that the two metals are put on a par, and no current is afterwards produced. The lead of the other flask, which had now been in water for over a week, was as bright as when first put in the water." Mr. Casamajor was unable to detect the least trace of lead in the flask where the lead or tin had been left in contact. And his experiments would seem to throw great doubts upon the assertions frequently made that tin and lead mutually act upon each other and poison the water. A great objection to tin-incased lead pipe and tin-lined lead pipe has been that in places where there was a fracture or where the surfaces came in contact under water a voltaic current was produced and some of the lead was carried into solution. Mr. Casamajor's experiments do not confirm this theory, but, on the contrary, he could find no lead whatever, although he put the metals in the most favorable conditions for accomplishing the reaction, if any could be expected. Lead and copper in contact under water at once react upon each other, but lead and tin appear to be neutral after the formation of the first coating. It would be gratifying to have these experiments confirmed, as a good deal of disquieting doubt has been cast upon the security that was supposed to be offered by the tin-lined and tin-incased lead pipe. In reference to the danger of leaving water in contact with lead alone there appears to be no doubt in the mind of any person. And this danger is greatly increased by the presence of nitrates and chlorides in the water. Lead is a subtile poison, and too much care cannot be taken to prevent its presence in water that is required for domestic use.

THE USES OF SOLUBLE GLASS.

Although liquid quartz, or soluble glass has been known for more than fifty years it does not, even at the present day, have half the applications in the arts of which it is capable. It was accidentally discovered by Prof. Fuchs, of Munich, while engaged in searching for a method by which to prepare pure silicic acid, and was afterwards very thoroughly studied by him, and all of its properties made known.

It is a very simple thing to make either in the dry or the wet way, and the choice of the methods depends upon the quantity to be prepared. Pulverized flint stones or quartz pebbles, or fine sand, can be dissolved in a solution of caustic soda or potash, when boiled under a pressure of 7 or 8 atmospheres. Infusorial earth or Tripoli is also admirably adapted for this purpose. In the dry way it is usual to fuse 45 pounds of quartz, 30 pounds of potash, and 3 pounds of charcoal powder; or 45 pounds of quartz, 23 pounds of calcined soda, and 3 pounds of charcoal.

For certain purposes it is also customary to make a glass of soda and potash combined. This mass fuses easily, and is readily soluble in hot water. As the solution absorbs carbonic acid from the air it must be kept well sealed.

Soluble glass is sold in liquid form of a given strength, usually 33 degrees, meaning 67 parts of water and 33 parts of the dry powder. When required for use it is necessary to dilute it, as the above concentration is too strong for most purposes.

There was at one time a proposition to boil gold quartz in the alkali of the West, and thus to bring it into solution by which the metal would settle and the liquid quartz could be converted into building stone or employed for any other purpose for which it is adapted. The quantities to be dealt with —the great amounts of soda required for the operation—appear to have stood in the way of the practical application of this method, but theoretically it was perfectly feasible.

It would not be easy to detail all of the uses to which soluble glass has been applied, but it may not be out of place to recapitulate some of them: To protect wood from the action of water, air, and fire; in fresco paintings on walls; to repair stone buildings; to make artificial stone; for cementing broken glass; to make hydraulic cement; to protect metals from rust; as a solvent for corallin; to mix with mineral colors; as a solvent for various substances; as a lubricator; to preserve the elasticity of leather bands on machinery; for painting on paper hangings and calicoes; to give glass the appearance of enamel; as a detergent; as a reagent in the laboratory; to impregnate petroleum barrels, beer casks, butter tubs, and milk pails, so as to render them tight; for glazing clay pots as a substitute for lead; and the manufacture of of artificial gems. Its chief value is in the restoration of stone buildings, in fresco painting, and to render fabrics uninflammable. As a means of preserving iron from rust, and as an external application to wooden buildings, it has been attended with so many failures as to throw doubt upon its practical value for these purposes. Its usefulness on leather belting we also deem extremely doubtful, although it has been recently asserted to keep such belts soft. It is an article that ought to be manufactured on a large scale and more generally used.

WHO DISCOVERED NITRO-GLYCERIN.

It is somewhat remarkable that the date of the discovery of nitro-glycerin should be a matter of dispute after all that has been published on the subject. The honor is sometimes ascribed to Professor Williamson (1853), and again to M. Nobel, the Swedish engineer who has done so much towards making its properties known; and to the late Professor Pelouze is also given the credit. In the transactions of the Turin Academy of Sciences for July 5, 1847, may be found a memoir on fulminates, and the action of nitric acid on certain organic compounds, by Professor A. Sobreso. In this paper the author gives an account of long and dangerous researches made by him on this subject.

He states how he prepared nitro-glycerin, mentions the properties of the new compound, and gives its principal re-

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