

Correspondence.

A Military Trolley Line.

To the Editor of the SCIENTIFIC AMERICAN :

Perhaps the greatest difficulty in the Santiago campaign was in the lack of transport, and I would like to ask if a military trolley line would have been feasible. A discussion might interest your readers in general. If a vessel had been sent with the squadron completely equipped for setting up and working a trolley, could not the reserve troops under guidance of experts have rapidly felled trees and made a road, with or without rails? A trolley would have added immensely to the efficiency of the commissariat. And it may be asked why contractors who furnish poor food and clothing are not as sharply looked after as are those contractors who furnish poor munitions. An army deserves to be as scientifically provisioned as were Nansen's expeditions. Certainly if a cake of kola chocolate and a lemon had been carried by the troops advancing on Santiago, the service would have been far more effective. Does not our scientific civilization involve the superseding of the army mule, hardtack and sow-belly? In short, has not the art of war as regards munitions advanced far beyond the land transport and commissariat departments? It appears to me that a discussion of these matters by the SCIENTIFIC AMERICAN at this time would be of great value and interest.

HIRAM M. STANLEY.

Lake Forest, Ill., July 19, 1898.

Vertical versus Inclined Armor.

To the Editor of the SCIENTIFIC AMERICAN :

In view of the recent advances in the manufacture of armor-piercing projectiles, I should like to ask about the relative values of the American and British systems of battleship protection for the "vitals."

It seems to me that the English device of curving the protective deck to meet the bottom of a thin belt will be found to be more efficient in the future than our own use of a single thick belt.

For example, take a United States ship with a 10-inch belt and an English battleship with equivalent armor of say a 6-inch belt reinforced by a 3-inch sloping deck; all the armor to be of Harvey reformed nickel steel. Then assume a capped shot with just sufficient energy to completely penetrate the 10-inch belt. In the United States ship we have now complete penetration; but in the British vessel, in penetrating the 6-inch belt the projectile loses its cap, and so has to attack the 3-inch inclined armor without the protection of a cap and with a point more or less weakened. Under these circumstances, I should think that the projectile would be broken up on the hard face of the 3-inch deck and fail of penetration.

I wish very much to get your opinion on this point, which seems to be of some importance.

GEORGE B. MOODY.

214 Broadway, Bangor, Me., July 24, 1898.

[There is much to be said in favor of both the systems above referred to. Their relative value will depend somewhat upon the type of projectile used by the enemy. If a solid armor-piercing shot is used, the thinner side armor and sloping deck will prove more effective, for the reasons suggested by our correspondent. In the other case, after passing through the vertical armor, the capless shot, if it were not shattered against the sloping deck, would probably be deflected and never reach the vitals. If armor-piercing shell were used, we think the vertical 10 inches would be preferable, for the reason that it would, in all likelihood, be burst before it got through, whereas it would stand a good chance of passing through the 6 inches of vertical armor and bursting in the bunkers and against the sloping deck. The great effort of designers is to give a ship such defensive armor that shells will burst outside the ship, and for this purpose the vertical armor is, we think, preferable.—ED.]

The Ancients' Hospitals.

A very interesting and pleasing discovery is announced from Baden, near Zurich. The learned have been discussing for ages whether anything in the way of hospitals was known to the ancients—it is not to be said that they have been disputing, for there was not material enough hitherto to support a lively argument. One might read the whole volume of Greek and Roman literature, carefully, too, without noticing one passage that might be interpreted as an allusion to a hospital. The works of Hippocrates could not fail to speak of them surely, if any existed; but nothing is there beyond a reference to the notes of "cases" observed in the Temple of Æsculapius. So it is generally assumed that there were no hospitals in those days; the Aesclepiæ were "baths" with massage treatment. Scholars who hold to the other opinion can adduce only hints in its favor. But now we hear that one has actually been discovered at Baden, containing "fourteen rooms, supplied with many kinds of medical, pharmaceutical, and surgical apparatus, probes, tubes, pincers, cauterizing instruments, and even a collection of safety pins for bandaging wounds"—but these

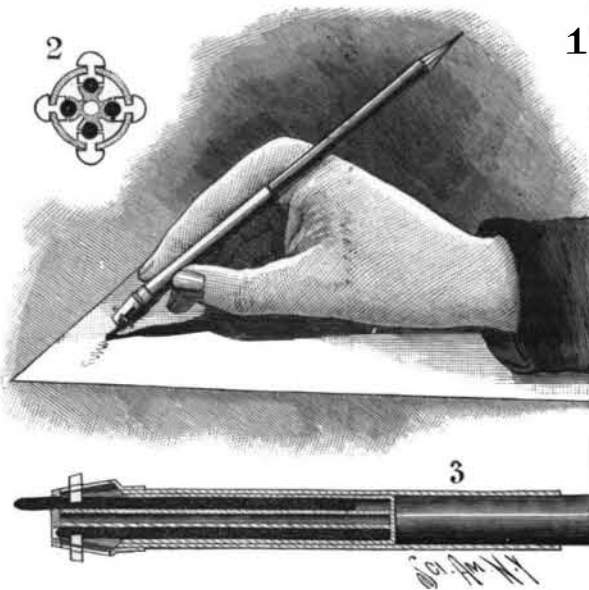
things are familiar. "There are also medicine spoons in bone and silver, measuring vessels, jars, and pots for ointment, some still containing traces of the ointment used." The latest date of the coins found appears to be in the reign of Hadrian. Probably it was a military hospital, for this was the station of the Seventh and Eighth Legions. But the find is certainly not less interesting on that account, for the army medical service of Rome and Greece is one of the deepest mysteries of archæology. Cæsar refers only once to his regimental surgeons—is there a single distinct allusion elsewhere? We hail with puzzled gratitude the casual remark of Xenophon that the Spartans sent their doctors to the rear when a fight impended—but we look vainly for more information from him or anybody else.

AN IMPROVED LEAD PENCIL.

A lead pencil has recently been patented by Gottlieb M. Seidel, of Easthampton, Mass., which is arranged to hold different movable leads, any of which can be readily projected and locked in place for immediate use.

Referring to our illustrations, it will be seen that the pencil is provided with a casing, one end of which is open and adapted to receive an ordinary pencil or eraser. The other end, however, has a number of longitudinal chambers or recesses containing leads of different colors or of different degrees of hardness. Each lead may be extended through a head on this end of the casing when in use, and may be locked in place by any suitable means. The locking device illustrated in Figs. 2 and 3 consists of a slide fitted to move on inclined guideways formed in the head. When the slide is moved outwardly, its inner end presses against and locks the lead in place.

When it is desired to use one of the leads, the corre-



SEIDEL'S LEAD PENCIL.

sponding slide is moved rearwardly to release the lead, and upon tilting the casing slightly, the lead is projected outwardly and may be locked in place by moving the slide forward.

Photograph of the Holy Shroud by Electric Light.

In Turin, the other day, according to Il Osservatore Romano, a photograph by electric light was taken of the Holy Shroud, which gave an admirable reproduction of the body of Christ, says The Electrical World. The Holy Shroud was recently exposed to veneration, and King Humbert, who is its hereditary guardian, at first hesitated to give authority to have it photographed, lest the photographs should be speculated in. However, his Majesty at length gave the requisite permission to Signor Secundo Pia, a lawyer and member of the committee on sacred art, who had offered to photograph the Holy Shroud at his own expense. Signor Pia prepared his plates according to a special method, rendering them sensitive to the yellowish tint of the Holy Shroud by means of powerful electric reflectors. "Formerly," says Il Osservatore, "the appearance of the Holy Shroud gave an idea of the contour rather than the facial lineaments and body of Christ. On the other hand, the photographs, on being developed, showed a perfect representation of the face, hands, and limbs of Christ, the general effect being that of a photograph of Christ and not of his shroud."

Street Cars of Manila.

If Manila surrenders without being bombarded by Rear Admiral Dewey, the American troops may feel very much at home there when they ride through the streets of Manila in street cars which were built in this country, says The Railway Review. The total street car equipment of the "Tranvias de Filipinas" was built by the J. G. Brill Company, of Philadelphia.

Miscellaneous Notes and Receipts.

Testing Sumac.—Prof. W. Eitner says, in Der Gerber, that sumac is best tested for purity by using a microscope. The leaves of *Rhus coriaria*, from which the Sicilian sumac is prepared, are covered with very fine hair upon both sides, especially on the back, which covering is so glaring that the detection of a sophistication is easy.

Waterproof Gelatine Paper.—The paper is coated on both sides with a solution consisting of 1 part gelatine, 4 parts water, and 1 part glycerine. Coagulate the gelatine and immerse the paper in a solution of 750 c. cm. of formol in 5 liters of water. The paper thus treated is, after drying, impervious even to steam.—Nueste Erfindungen u. E.

New Thermometer Fluid.—In determining low temperatures, thermometers filled with toluol alone or with a mixture of toluol and alcohol were employed heretofore. These latter thermometers could only be used as far as minus 100 degrees (below zero), because the said mixture solidified in a lower temperature. According to Kohlrausch petroleum-ether, whose freezing point lies as low as about 190 degrees (C.?), is very suitable as a filling for thermometers to determine low temperatures.—Pharmaceutische Centralhalle.

A simple method to restore the illuminating power of mantles was reported by Franck to the Polytechnic Society, at Berlin. As is well known, the mantles relax in illuminating power after they have been in use for some time. This luminosity may be restored to a certain degree, by blowing out the mantle from the inside during the burning, which can be accomplished with the aid of a small glass or paper tube. The president of the said society stated that he had personally tried this medium and had found it effective and, in consequence, recommendable. In order to facilitate the carrying out of the process, the German Incandescent Gaslight Company manufactures a tube, mounted in a rubber ball, which is very convenient for the said purpose.—Nueste Erfindungen und Erfahrungen.

A Superior Solvent for Nitrocellulose.—Artificial silk prepared in the well known manner from cellulose has not met with the favorable reception expected. This is principally due to its behavior in presence of water. In a moist condition it loses 90 per cent of its strength, and this characteristic, without taking into account the objections raised by customers by reason of this peculiarity, renders the manipulations of dyeing and finishing difficult. To correct this evil an English inventor has been issued letters patent for remedying the hygroscopicity of artificial silk—that is, its inclination to absorb water. The process consists in the addition of formaldehyde, acetaldehyde, paraldehyde, benzaldehyde, or any other substance belonging to this group, to the solvent of the nitrocellulose, or in treating the drawn thread with a solution of these substances. The quantity of the formaldehyde or the agents required for the treatment before the denitration of the finished spun threads may be as much as 15 per cent of the weight of the nitrocellulose. Since formaldehyde or the above mentioned agents, in combination with ethyl alcohol or methyl alcohol, ether, etc., is an extremely active solvent of nitrocellulose, it is advisable to add the formaldehyde, etc., when commencing to treat the nitrocellulose and to mix it.—Leipziger Faerber Zeitung.

Testing Commercial Albumen.—Gelatine, dextrine, and mucilage are generally used for adulterating the dry commercial albumen. Again, the albumen may also be worthless through partial coagulation. For testing a sample, 2 grammes are stirred into a small quantity of distilled water, by which a sophistication with flour may be recognized. The mass is next diluted with water to make 200 c. cm.; if the albumen contains no coagulated admixture, the solution remains clear. To 100 c. cm. of the solution are next added 35 c. cm. of a 1 per cent tannin solution and about 0.2 gramme of a pure commercial tartar. This mixture is agitated and filtered. One-half the filtrate is mixed with a 0.5 per cent gelatine solution (of which 25 c. cm. correspond to about 0.1 gramme of pure commercial tannin). If the sample is pure albumen, there must in no case be a precipitate. Should the gelatine cause a precipitation, then an excess of tannin is present; the albumen contains in this case either adulterants or else it is coagulated in part. If a precipitate is caused at the second addition of tannin to the albumen solution, the albumen is adulterated with gelatine or similar substances. From the quantity of tannin required for the second precipitation may be determined approximately the gelatine present, as the latter is capable of precipitating about four times as much as the same weight of dry albumen.

The presence of gelatine and of dextrine in albumen may also be ascertained by heating the solution of the product in a water bath. The albumen coagulates thereby and may be separated by filtering. If the sample is pure, the filtrate will give no precipitate with tannin. Dextrine and gum arabic can be found in the filtrate by the usual test methods.—Ann. Chim. Anal. Appliq., 1897, p. 241.