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The Volunteer Review,

AND

MILITARY AND NAVAL GAZETTE.

"Unbribed, unbought, our swords we draw,
To guard the Monarch, fence the Law."

OTTAWA, MONDAY, APRIL 1, 1872.

INDIA rubber pontoons are liable to destruction by sulphuric acid formed from contact with water charged with nitre or carbonate of soda, (common salt), they are also liable to air leaks and chafing when launched from a gravelly beach.

In order to remedy those defects it has been proposed to employ a pontoon of corrugated galvanized iron of the following description: a boat twenty-one feet long with sharp bow and stern, five feet six inches wide for a length of thirteen feet and two feet deep; air-tight compartments with valve openings occupy both extremities, making a powerful life-boat, each boat has four thwarts for rowing and can transport from fifteen to twenty men; its weight will be 615 lbs. It is anchored in the usual manner at twenty feet between each pontoon from centre to centre and the bays are formed with *balks* and *chesses* in the usual way.

The advantages of this bridge train would be many, its disadvantages the additional weight.

Bridges formed of casks lashed together in pairs can be rendered very effective for the passage of troops, by proper combination with transoms they can even be made to support artillery with safety, most of our rivers are large and it is not very likely that this method could be rendered easily available.

A river may be easily and rapidly crossed by a flying bridge formed of a raft, all that would be necessary in this case would be a cable sufficiently strong, and as the weight depending on it can be easily calculated, the strength of the rope and its size may be as easily found.

A raft forty feet in length and ten feet wide will transport sixty soldiers, equal to 10,800lbs., the raft will weigh 13,200 lbs., total, 24,000 lbs.; a cable five inches circumference would support a strain of 28,500 lbs., such a raft would therefore be capable of transporting the heaviest material of an army.

In operation it would have one grave fault, it would be slow work, but it would enable troops to travel without a costly bridge equipage as axes, augers, a hand saw or two, and the necessary quantity of cable, say one to three hundred fathoms, would be all that would be required, a five inch cable would weigh 13½ lbs. per fathom, and 300 fathom would weigh 4,050 lbs. a load for two waggons with a small pontoon for crossing, it would be possible to cross 240 men per hour on the flying bridge described, with the material at hand it could be built in two hours or even less.

If circumstances required, the passage of a large force and the necessary time could be afforded for the construction of floating bridges, rafts of the above description moored thirty feet apart from centre to centre would afford a cheap, stable and safe bridge, one easily destroyed, if a retrograde movement should make that operation necessary, and as easily constructed; in such a case good mooring anchors would be required.

A description of raft making is hardly necessary in Canada, where it is a portion and a very important one of the staple trade of the country.

A raft should be composed of the lightest possible material in pieces of equal length and as nearly as can be of the same diameter, kept together by traverses crossing it laterally and confined if necessary to each piece by a tree nail of wood.

Ordinary pine will weigh about 33 lbs. per cubic foot, water 62½ lbs. a log twelve inches square will float half out of the water, and it will take about 29 lbs. on each foot of its length to barely submerge it.

Allowing the logs in the raft to be forty feet each and ten feet wide, each raft will bear 11,600 lbs. beside its own weight, and according to the rules given for the India rubber pontoons, any weight which could be put on them belonging to an army or its equipment.

Trestle bridges are useful for crossing rivers or shallow streams, the depth of water should not exceed eight feet, nor the velocity of current more than five feet per second, with the bottom hard and even, as the trestle will form an obstruction to the current which would cause it to excavate under its sill and destroy the stability of the bridge, causing probably a fearful accident; burthened with equipments, a soldier is especially helpless in such a case.

The construction of the trestles should be as simple as possible, so that any intelligent soldier could frame them, and they should not be a greater distance than fifteen feet apart.

If the conditions of the stream are such as has been described, it will not be necessary to pass artillery on trestle bridges, it can be hauled over the bottom of the river and the horses made to swim; the limbers and waggons can be taken over by hand.

Trestles may either be formed as described for India rubber pontoon land bays, or with four legs about six inches square with a spread of one fourth the vertical height, at one fourth the height from the bottom, transoms are halved into the legs and nailed in their places nine inches from the top, upper transoms or cap rests are halved and nailed into the legs leaving a width of nine inches for the cap sill of sixteen feet in length, the upper end of each leg is bevelled off to lay square against the cap sill to which it is firmly spiked.

Six good men will make one of those trestles in three hours, or even less time; the roadway will be laid as previously described, a raft or boat will enable the trestles to be laid with facility.

Pile bridges are made when trestles can not be used, they are *generally six to nine* inches in diameter and driven with a heavy maul *into the bed of the river, four of* them enabling a bridge twelve feet in width to be constructed, *a cap sill 14 feet long* and nine inches square is checked to receive the heads *of piles to which it is fastened* with spikes or tree nails, the roadway is laid as previously described with *balks and chesses.*

In practice many varieties of those bridges will present themselves and the ingenuity as well as professional skill of the Military Engineer will be tested to provide for their rapid construction, their strength and applicability to the service required as well as the site.

Every nation pretending to civilization has adopted as part of their military establishment, a bridge equipage with a corps of artisans especially trained to construct those very important adjuncts of successful military operations.

In this particular Austria has taken the lead, having one of the broadest, deepest, and most rapid of European rivers—the Danube—to manœuvre on.

The system adopted consists of trestle and pontoon bridges.

The trestle is composed of two legs to the lower ends of which iron shoes are attached.