RIVETED JOINTS FOR STEEL PENSTOCKS AND TANKS

(Continued from page 200)

In Table 6, for ¾-in. plate the thickness of butt strap is given as ½ in. In Table 8, the minimum rivet diameter for ¾-in. plate is ⅞ in., and the maximum for ½-in. plate is 1⅜ ins.

First trial: Assume 1⅛ ins. diameter rivet and a long pitch of 16⅜ ins. Then

$t = 0.75$ in. $c = 95{,}000$ lbs. per sq. in.
$P = 16\frac{3}{8}$ ins. $= 16.375$ ins. $s = 44{,}000$ lbs. per sq. in.
$d = 1\frac{3}{16}$ ins. $= 1.1875$ ins. $S = 88{,}000$ lbs. per sq. in.
$a = 1.1075$ sq. ins. $b = \frac{1}{2}$ in. $= 0.5$ in.
$f = 55{,}000$ lbs. per sq. in.

$A = Ptf = 16.375 \times 0.75 \times 55{,}000 = 675{,}469.$

$B = (P-d)tf$
$= (16.375-1.1875) \times 0.75 \times 55{,}000 = 626{,}484.$

$C = NSa+nsa$
$= (8 \times 88{,}000 \times 1.1075) + (3 \times 44{,}000 \times 1.1075) = 925{,}870.$

$D = (P-2d)tf+nsa$
$= [(16.375-2 \times 1.1875) \times 0.75 \times 55{,}000] +$
$(3 \times 44{,}000 \times 1.1075) = 723{,}690.$

$E = (P-2d)tf+dbc$
$= [(16.375-2 \times 1.1875) \times 0.75 \times 55{,}000] +$
$(1.1075 \times 0.5 \times 95{,}000) = 630{,}114.$

$F = Ndtc+ndbc$
$= (8 \times 1.1875 \times 0.75 \times 95{,}000) + (3 \times 1.1875 \times 0.5 \times 95{,}000)$
$= 846{,}094.$

$G = Ndtc+nsa$
$= (8 \times 1.1875 \times 0.75 \times 95{,}000) + (3 \times 44{,}000 \times 1.1075)$
$= 823{,}065.$

$H = (P-4d)tf+nsa$
$= [(16.375-4 \times 1.1875) \times 0.75 \times 55{,}000] +$
$(3 \times 44{,}000 \times 1.1075) = 625{,}721.$

$I = (P-4d)tf+ndbc$
$= [(16.375-4 \times 1.1875) \times 0.75 \times 55{,}000] +$
$(3 \times 1.1875 \times 0.5 \times 95{,}000) = 648{,}756.$

$e = H/A = 0.926 = 92.6\%.$

Maintaining the same diameter of rivet, a long pitch of 16½ ins. gives an efficiency of 92.7%. The short pitch in this case is 4⅛ ins., which is approaching closely to the maximum limit for caulking that should be used.

Using 1⅜-in. diameter rivets, the maximum permissible pitch may be increased above that for 1⅛-in. rivets by 1½ times the change in rivet diameter, making $P = 18$ ins., for which the efficiency is 92%.

To obtain an efficiency of 92.7% with 1⅜-in. diameter rivets, a long pitch of 19¾ ins. is necessary. Since this exceeds the 18-in. limit, it cannot be used; therefore the proper joint is obtained by using 1⅛-in. diameter rivets with a long pitch of 16½ ins.

To find the necessary thickness of butt strap,

$b = [P/2(P-nd)]te.$
$= [16.5/2(16.5-4 \times 1.1875)] \times 0.75 \times 0.927.$
$= 0.489$ in.

Therefore, butt straps ½ in. thick, as given in Table 6, are sufficient.

PUBLICATIONS RECEIVED

MANUFACTURE OF MUNITIONS IN CANADA.—Presidential address of H. H. Vaughan at the last annual meeting of the Engineering Institute of Canada. 92 pages and cover, 6 by 9 ins., illustrated.

TESTING OF ANEROID BAROMETERS.—Bulletin 42 issued by the Topographical Surveys Branch of the Department of the Interior, Ottawa, describing the testing of aneroid barometers at the laboratory of the Dominion Lands Surveys, and commenting briefly on the errors of aneroids and their general characteristics.

D. H. McDougall, president of the Nova Scotia Steel & Coal Co., Ltd., has completed, for his company, the purchase from the British Ministry of Shipping, represented by Director J. B. Whyte, of New York, of the coal-handling plant at the Canadian National Railway terminals, Halifax.

WATER PURIFICATION UNITS MOUNTED ON MOTOR TRUCKS

(Continued from page 202)

admirable factory in Camden, N.J., was obtained, and here, in conjunction with our construction work, a school was conducted for Sanitary Corps men, members of the water-tank train, and officers who were to have charge of the trucks in operation.

Fig. 2 shows the units as finally developed, closed and ready for the road, and the detailed arrangement is indicated by Figs. 1, 3, 4 and 6.

Fig. 3 shows the rear of the completed truck, with the rear and side gates let down for operation. The gasoline storage tank is to the right of the pump. The provisions made for carrying and chaining the suction hose are shown.

The filter, central control valve for operation of the filter, soda ash solution tank, alum pot, dechlorinator and further details of the pumping room are shown in Fig. 1.

Arrangement of Apparatus

In the upper right hand corner of Fig. 1 may be seen a tool box in which a complete set of pipe cutting and fitting tools are kept, in addition to hand tools needed about a machine shop, and beneath this tool case, is the chemical bin for storage of alum, soda ash and thiosulphate.

The laboratory arrangement in the final truck is shown in Figs. 4 and 6. The provision made for carrying chemical bottles is indicated, as is also the sink for washing glassware, and a hand air-pump for creating pressure in the storage tanks when the pumping equipment is not in operation. A 37 deg. incubator for bacteriological samples, oven for sterilizing glassware and electric lighting equipment are shown, while in the rear of the laboratory is seen a standard solution-feed chlorinator, and beneath it, the thiosulphate and soda ash controls. On the bench beside the chlorinator is a pressure auto clave for sterilizing purposes.

The first several trucks were mounted on 3½-ton White truck chassis, but by far the largest number were mounted on 5-ton, 17 ft.-wheel-base Pierce-Arrow chassis. Novo 3 h.p. gasoline engines were used, with Gould 5 by 5-in. force pumps. The filter was constructed by the Roberts Filter Mfg. Co., of Darby, Philadelphia, Pa., and the electric lighting equipment by the Vesta Storage Battery Co. The rated capacity of the unit was 1,000 gals. per hr., although the actual delivery was nearer 1,500 gals.

The support of the filter, which weighed 2,400 lbs. without the water, presented problems that required careful study. The final solution was to fasten 5-in. steel H-beams to the chassis frame by U-bolts, bolting the filter to the H-beams by feet cast on the special filter base.

Over Thousand Articles Carried

In addition to the equipment shown in Figs. 1 and 3, 1,031 articles were carried; still, much to our dismay, when the trucks were first placed in operation, we found that we had overlooked the very obvious item of a box of matches!

These units rendered valuable service under actual military operation in France. Some of them were damaged by shell-fire and some members of the Sanitary Corps were wounded while operating the units near the firing line.

Acknowledgement must be made of our appreciation of the co-operation extended by the surgeon-general's office, the Sanitary Corps, the Engineer Depot, and particularly to the following officers:—Col. F. F. Longley, Lt.-Col. Edward Bartow, Major H. McC. Yost, Capt. Morris Scharff, Capt. Gerald W. Knight, Capt. W. F. Wells, Capt. J. J. Newman, Lt. A. H. Wagner, Lt. H. H. Scott and Lt. T. W. Smith.

Without the suggestions and co-operation of M. F. Tiernan, and C. F. Wallace, of our organization, these units could not have been constructed, and special thanks are due to two members of our staff until recently in service in France, Capt. A. R. Murphy, who materially contributed to the development of the first unit in the tests at Maplewood, N.J., and Capt. R. V. Donnelly, who was in charge of their construction at Camden, N.J. Thanks are also due to the engineers of the Roberts Filter Mfg. Co. for their special co-operation.