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SYSTEM FOR JOINING PARTS OF METALLIC STRUCTURES TO EACH OTHER
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FIG. 1

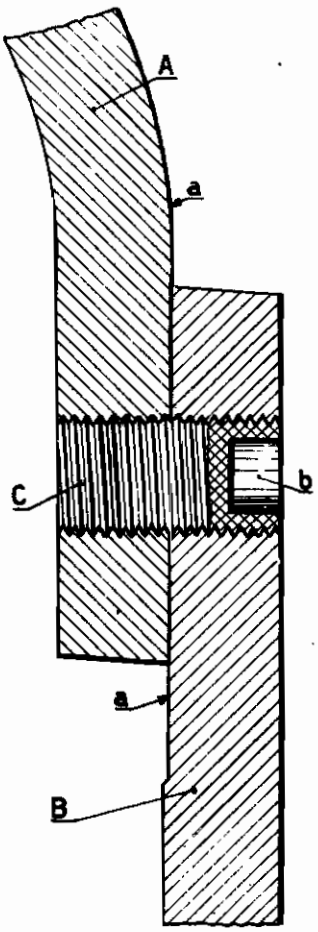
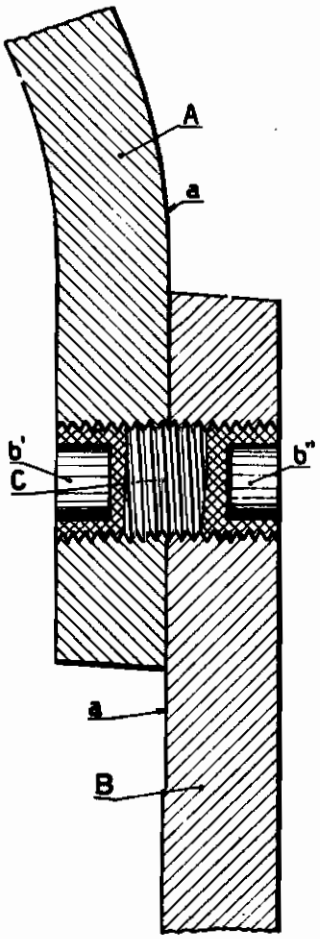


FIG. 2



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ALIEN PROPERTY CUSTODIAN

SYSTEM FOR JOINING PARTS OF METALLIC STRUCTURES TO EACH OTHER

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It is known the fact that the rivets in the rivetings used in industrial constructions for joining metallic parts, undergo not only shear stress but tensile stress too, and this is because they are applied with heat, and when they cool they have a tendency to become shorter. Heat is employed for this purpose so that the shanks of the rivets will ram in the holes to have the parts engaged well between each other. It is furthermore known that while shear stress can be calculated, tensile stress cannot be calculated exactly as it depends on the temperature, which is essentially variable and doubtful, at which the rivets are applied. Within certain limits this tension contributes sometimes to keep the parts together, but it generally does harm to the strength of the rivets and hence to that of joining: it not unrarely happens that the heads of the rivets come off by themselves, during operations of caulking for tightness. On the other hand the diameter of the rivets becomes less on cooling and therefore they no longer fill the holes exactly in which they are inserted. The longer the rivets are and the larger their diameter is, the easier it is to meet with such troubles which are particularly serious when steam boilers are dealt with, or generally pressure containers where perfect tightness of the parts between each other is required besides mechanical joining.

The subject-matter of this invention is a system of joining the parts of metallic structures to each other and it entirely does away with the troubles mentioned above.

According to the invention the system substantially consists in using threaded stud bolts instead of heat applied rivets, which are hollow at one of their ends at least and they are screwed without heat in the holes made through the parts to be joined and threaded according to the corresponding female screw, after which they are broached and pressed or caulked in their hollow end or ends until complete adherence takes place between their threading and the female screw threading of the corresponding holes in the parts to be joined.

The hollow at one or both the ends of the stud bolt does reach the part of it corresponding with the line where the parts to be joined touch, and this is because the whole section of the stud bolt intervenes there to hold out against the shear.

While the full part of the stud bolt has the task of holding out against shear stress in this way as mentioned hereinbefore, its threading has the function of the heads of rivets, with the advantage that as application now takes place without heat, there is no shrinkage whatsoever either in the section or in the length, and hence no supplementary stresses occur of unknown ranges. The advantage is furthermore obtained of perfect tightness ensured with the close and absolute adherence, which, with the aforesaid broaching, pressing or caulking is obtained between the threads of the screw and those of the female screw.

The length of the stud bolts will at least equal to the total of the thicknesses of the parts to be joined; but greater length can be suggested however for the hold required for the operation of threading and forcing of the stud bolts in the tapped holes. In view of the foregoing it will likewise be advisable to use the same material as that of the parts to be joined for the stud bolts for the purpose of having the same strength in all points.

It is generally enough and easier to broach the outside end of a stud bolt, but when this operation is not considered to be sufficient, it must be repeated at both ends. As mentioned hereinbefore, radial pressure by hand caulking or with pneumatic hammers can take the place of the broaching, so as to obtain in all cases perfect adherence of at least some threads of the male threading with the corresponding threads of the female threading.

The parts to be joined, i. e., sheet metal, sections or forged pieces, must of course have very smooth touching surfaces and this should always be the case in joinings.

Two examples of practical performance of the invention are illustrated in the drawing annexed hereunto to make it clearly and thoroughly understood: Fig. 1 shows the first example sectioned according to the axis of a stud bolt and Fig. 2 represents likewise the second example.

Both the examples refer particularly to the most interesting case of joining between a forged bottom A and a cylindrical body B for a steam boiler or a pressure container, obtained by forging, wiredrawing or welding. As usual the surfaces *a—a* that have to touch are turned so as to be slightly tapering, and the bottoms are applied with heat. Likewise as usual the bottoms and the cylindrical body are perforated at the same time on one row or more: on one row only in the cases illustrated.

According to the invention each hole is tapped either with a male tapper or preferably with a slightly tapering male tapper, after which a part C, C′ is screwed without heat in each hole, this part being threaded in correspondence with the

tapper used for the holes and preferably made of the same material as that of the parts A, B to be joined. In the cases illustrated the said part C, C' is exactly as long as the total of the thicknesses of the parts to be joined, but it can even be longer as mentioned before. Furthermore, the aforesaid part C, respectively C', has at one end or respectively at both, a hollow *b*, respectively *b'*, *b''*, and therefore after being screwed up as mentioned hereinbefore, its hollow end or ends are broached with means like those used for broaching pipes, or pressed, or caulked, so that the threads of the said end or ends enter into close contact and engage with the corresponding threads of the holes in parts A, B. Joining is finished after the foregoing.

When carried out with due care, the strength of a joining thus obtained for pressure and tightness can be compared with that of cylindrical bodies having forged ogival bottoms. A large saving in constructions is furthermore obtained by making use of the system according to this invention, with the possibility of obtaining from an ingot a body of larger capacity and resisting to higher pressure than those obtainable with ogive shaping formation of the bottoms.

It is obvious and it must be thoroughly understood that the examples illustrated and described do not confine the invention in any way, and that therefore any other manner of performance of the inventive concept laid out hereinbefore comes within the range and under the protection of this patent.

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