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ART OF SEALING AND LOCKING THREADS

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4 Claims. (Cl. 85—1)

This invention relates to the art of sealing and locking threaded and like members, by the employment of compositions which permit the interengagement of threaded or like parts and then oppose a maintained resistance to the separation of the parts by reason of vibration or other involuntary action; and is more particularly concerned with compositions and methods employable to this end, and to the production of localized coatings effective for the purpose.

In many instances, it is desirable to provide members which are threaded or otherwise slid into joined relationship, and to have these members secured against later separation under the conditions of vibration or the like. Mechanical locking devices in the nature of spring pieces, such as split washers, dished washers with locking tongues, mechanical ratchet members, etc., having been heretofore employed; and also the employment of cements, solders and like materials has been indulged to prevent such separations. With the mechanical devices, additional parts are necessary, with attendant difficulties of possible loss of these parts and of their effects upon the elements being assembled, along with the necessity of having a large stock of various sizes of such materials for employment at particular locations. Cements and solders have permitted the securing of nuts, bolts, etc., but have been attended with the difficulty of normally necessitating the employment of heating means or the like for later separation of the parts, and this separation often leaves the members incapable directly of reassembly.

In accordance with the present invention, a composition is employed for sealing such relatively movable members to one another, in association with lubricating means and a specific manner of employment whereby an original coating at the factory will serve for producing the desired effect for a number of successive voluntary engagements and disengagements of the members.

In the preferred form, the invention is practiced by employing an adherent composition. Upon this basic coating is applied a coating which is adherent to the base coating and is capable of relatively easy deformation under the action of engaging the members, and of producing adhesion to the member being brought onto the base coating. In particular, where the invention is employed with threaded members, such as nuts and bolts, the aforesaid treatment is preferably localized and confined to a specific part of the bolt only, whereby to obtain a more easy engagement of the parts and a definite assurance that the engaged parts shall be held against accidental separation.

The composition can be employed for fittings of brass, steel, aluminum, aluminum alloy, and other metals: and is resistant to the effects of oil, gasoline, air, water, etc. Thus, it can be employed for sealing conduits, bolt and nut connections, etc., for such services.

The preferred basic coating is a modified polyvinyl acetate in the form of a 24.5 per cent by weight solution in toluol, such as is obtainable commercially under the trade name XL5041. The base of this solution may be replaced by another vinyl polymer resin, and a different solvent may be employed, so long as the composition is capable of depositing a coherent and tough film. In particular, it has been found advantageous to employ lacquer solvents in lieu of toluol, to take advantage of the relatively high vapor tension for obtaining a quick drying operation.

This base composition is preferably applied to the thread by a brush or other applicator, and the fittings are permitted to dry in the air, and are then baked at a temperature of, for example, 450 to 500 degrees F. in order to set the coating, for a time of five minutes for small parts and ten minutes for larger parts. Care is taken that the time and temperature are not such as to result in degradation of the vinyl film.

In making such application to the threads, it is prefered to utilize the composition only on the male members, since a better control by way of uniformity and thickness of coating can thus be obtained, with freedom from applying the coatings to the initial parts of the threads, and with assurance of easy inspection of the presence and adequacy of the coatings utilized.

In particular, the coating is preferably applied in a restricted local manner, to extend over a portion of the male thread which is to be occupied by the corresponding nut or other part, while the initial portion of the male thread, for, say, one-half to one and one-half turns of the thread is left free of the coating, and thus serves as a "starter" section for easy assembly of the parts.

Upon this base coating is then applied a film of beeswax, it likewise being so applied by a brush or other applicator as to leave the initial portion of the thread clear, or it may be employed by dipping, with a subsequent removal of the beeswax for such an initial portion of the thread,

The beeswax has a satisfactory adherence to the vinyl resin film, and also to the metal when the parts are threaded forcibly together. It serves as a lubricant in the first operation of assembling the parts, and fills out all interstices in the respective threaded portions so that the locking effect is not only that exerted between the metal-vinyl resin-metal relationship but also that from the physical presence of the beeswax throughout the remainder of the juxtaposed areas.

The operation of assembly can be effected by starting the members together by hand, and then tightening the parts with a wrench or other suitable tool in the usual manner; and disassembly can be effected in a reverse fashion. It has been found that such parts may be assembled and disassembled a number of times without such excessive wear or dislocation of the nut-locking materials that accidental loosening may occur. The base coating and also the beeswax are not modified by atmospheric influences nor by normal contact of materials with the threaded assemblage while in service. Since the vinyl coating alone provides a substantial locking, the material can be employed even in instances where a particular bolt is exposed to a relatively high temperature.

It may be pointed out that when lacquers and alkyd resins are employed in lieu of vinyl polymer resins, the results are not satisfactory because the adhesive powers of such other materials are insufficient, so that a few engagements and disengagements of the bolt and nut destroy the locking power, due to peeling and chipping of the coating or to freeing of the bond between the coating and the bolt. The torques which must be exerted to resist loosening by vibration, and the corresponding forces required for engaging and disengaging the parts, demand adequate adhesion, and this has not been obtained with such alternate materials.

The beeswax coating not only serves as a lubricant for proportioning the turning torque at a value low enough so that there will be no damage to the threads or to the bolt while adequately high to prevent loosening of the nut by vibration, but also it serves to provide a thin firm film on the vinyl polymer resin and prevent the threads of the nut from cutting into the film of the vinyl polymer resin. While the beeswax has a high adhesion to metal under normal conditions of service, the adhesion between the beeswax and the vinyl polymer resin is much greater than that between the beeswax and the bare metal of the nut itself. This effect is revealed in that a treated bolt can be successively used with a large number of clean fresh nuts, and at each assembly will exercise the retaining function.

It is obvious that the invention may be employed in many ways within the scope of the appended claims.

I claim:

1. A coating upon a mechanical metal part for locking the same to another metal part when forcibly engaged therewith, comprising a coherent film of vinyl polymer resin and a layer of beeswax upon said film, said film and layer having the characteristic of assuring repeated assemblies and disassemblies while maintaining a high locking effect.

2. An article having a threaded metal portion and a coating upon said portion comprising a coherent film of vinyl polymer resin and a layer of beeswax upon said film, said coating being effective for locking said threaded portion against accidental disengagement from a mating metal element assembled thereon, said coating having the characteristic of assuring repeated assemblies and disassemblies while maintaining a high locking effect.

3. An article comprising a metal portion having a male thread, a film of vinyl polymer resin upon the major portion of said thread, said thread being free of said film at its end, and a layer of beeswax upon said film, said film and layer having the characteristic of assuring repeated assemblies and disassemblies while maintaining a high locking effect.

4. An article comprising a threaded metal portion and a coating upon said threaded portion comprising a coherent film of vinyl polymer resin, and an adherent dressing of beeswax located in the threaded grooves, said film and dressing having the characteristic of assuring repeated assemblies and disassemblies while maintaining a high locking effect.

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