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(54) **Threaded masking plug**

Verschraubter Maskierungsstopfen

Bouchon vissé pour le masquage

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Description

TECHNICAL FIELD

[0001] The present invention relates to a plug for masking a threaded hole in spray painting, powder painting and similar processes, comprising a threaded portion for threading in the hole, the threaded portion being manufactured from an electrically conductive material.

BACKGROUND ART

[0002] Such a plug is for instance known from document FR-A-2 715 200.

[0003] In processes such as spray painting and powder painting of objects, in particular metal objects, there is a need in the art to protect holes that are disposed in different places in the object, in particular in those cases when the holes are threaded. If the holes are not protected, they will also be painted and their dimensions will be changed in an unforeseeable manner. The problem is particularly severe if the holes are threaded, since even very slight quantities of paint in the threads will make it impossible to use the threads as intended.

[0004] Use is therefore made of so-called masking plugs in an attempt to protect the holes. In its simplest form, the plug is a rather simple stopper which in form is reminiscent of a bottle cork and hence displays a gently tapering shape, such as frustoconical, with the result that it is easy to fit into the hole, and it fits many different hole sizes.

[0005] However, one problem is that if the object with an enclosed air volume is painted, pressure differences occur between the enclosed volume and the ambient atmosphere, because of heating and subsequent cooling. The pressure differences may, on the one hand, result in the masking plug being dislodged and/or that paint is sucked into the hole past the sides of the plug.

[0006] The plug may also be made straight and is then often manufactured from an elastic material which becomes narrower on being stretched and then reassumes its original shape. In certain cases, the plug is also made hollow so as to increase the possibilities of deformation. One drawback is that elastic plugs that are hollow quite easily accumulate liquid. Another drawback is that both sides of the hole must be readily accessible for bringing about the stretching and deformation of the plug. Such is often not the case.

[0007] One problem that is common to prior art existing plugs of the above-described types is that the upper part of the thread, typically the uppermost turn, is not protected and as a result the screwing-in of screws into the threaded hole after painting is rendered impossible even if the greater part of the threaded section has been protected from paint. In such instance, one possible solution is to provide the plugs with a collar which also covers the uppermost thread turn. Unfortunately, there are other problems inherent in the prior art existing plugs. The main problem is that the non-conductive material from which moist plugs are manufactured repels the powder that is employed in powder painting, since, in such instance, use is made of a potential difference between the powder and the object being painted. The repulsion from the non-conductive material implies that a short distance from the plug, there will be built up a thicker layer of paint powder and thereby a thicker paint layer. Thus, a small 'rampart' occurs around the hole. This gives not only an anaesthetic impression, but may also be a drawback when the threaded hole is later to be used, for example, for threading in a bolt together with a washer. It is then difficult to tighten the bolt correctly. Moreover, the 'rampart' may have sharp edges, which causes problems in the continued manual handling of the painted object.

[0008] Since, in powder painting, the intention is to create a potential difference between the powder and the object being painted, it is desirable if there is an unbroken electric conduction between the hooks on which the object is suspended and the object proper so that the object may be earthed via the suspension hooks. Moreover, it is particularly advantageous if this suspension may be put into effect in the masking plug so that no special suspension devices need be provided elsewhere on the object. The drawback that extra hanging marks occur in the painting is thereby avoided. The problem in such plugs as are manufactured entirely of metal is, like suspension devices in general, that the masking plug and its associated suspension device become, on repeated use, completely painted over and lose their conductive capacity. Temporary solutions where the masking plug is wholly or partly protected by tape or the like are far too time-consuming and irrational to function in industrial contexts. Cleaning by mechanical processing of the masking plugs or by using solvents is, in general, also far too time-consuming. If solvents are employed, this is also a hazard from the environmental viewpoint.

PROBLEM STRUCTURE

[0009] Thus, there is a need in the art to produce a masking plug which protects a thread in a hole, throughout its entire length even under different pressures on either side of the hole, which gives a uniform thickness of paint layer around the hole and which displays an acceptable electric communication between the object and any possible suspension devices, even after having been used a large number of times.

SOLUTION

[0010] The object forming the basis of the present invention will be attained if the plug intimated by way of introduction is characterised in that a head of a non-conductive material is disposed at the one end of the threaded portion for screening off the hole and its threads.

[0011] Further advantages will be attained if the plug is moreover given one or more of the characterising fea-

tures as set forth in appended Claims 2 to 8.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0012] The present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings. In the accompanying Drawings:

Fig. 1 is a perspective view of a masking plug according to the present invention;

Fig. 2 is a side elevation of a core included in the masking plug;

Fig. 3 is a straight side elevation of a head included in the masking plug;

Fig. 4 is a sectional view straight from the side of the masking plug;

Fig. 5 is a perspective view of the masking plug, an additional washer having been mounted in place; and

Fig. 6 is a schematic view straight from the side of the washer.

DESCRIPTION OF PREFERRED EMBODIMENT

[0013] Fig. 1 shows the masking plug 1 according to the present invention in perspective. The masking plug 1 has three major parts, viz. a head 2, a threaded portion 3 for threading into a similarly threaded hole, and an a transitional portion 4 which extends between the head 2 and the threaded portion 3.

[0014] In the preferred embodiment, the head 2 is hexagonal, which implies that it be mounted and dismounted with the aid of a tool in a wholly or partly automated process, but also by hand with or without the aid of tools. The head 2 has a centrally disposed hole 5 which extends in the longitudinal direction of the masking plug 1. The head 2 is manufactured from a non-conductive material which advantageously displays attraction in relation to the paint used, this attraction being less than the attraction prevailing in the object to be painted. In such instance, it will be particularly simple to remove residual paint from the head 2 of the masking plug 1 if desired. However, the plug will continue to function even if its head 2 is painted over.

[0015] The threaded portion 3 advantageously displays a standard thread size and the masking plug 1 is typically manufactured in several different variations with different standard threads. The threaded portion 3 is manufactured from a conductive material, in general a metal, so that an electric communication occurs between the object to be painted and the threaded portion 3.

[0016] In the preferred embodiment, the transitional portion 4 is substantially of frustoconical form. Its narrower end has a diameter which substantially corresponds to the diameter of the threaded portion 3 and its thicker end has a diameter that does not exceed, and typically is slightly less than the minimum transverse dimension of the head 2. On threading-in of the masking plug 1, the transitional portion 4 will sealingly abut against the uppermost turn of the thread and protect it from paint. The head 2 will shadow an area most proximal around the thread and prevent it from being painted as a result of its geometric configuration. The shape and size of the shadowed portion are also affected by electric attraction from other parts of the plug 1. This will be described in greater detail hereinbelow.

[0017] At the thicker end of the transitional portion 4, i.e. closely adjacent the head 2, there is provided a groove 6 in which an additional accessory for screening off a larger area around the hole may be disposed.. The material in the transitional portion is advantageously the same as in the head 2 and is advantageously elastic so as to realise a dependable sealing abutment of the transitional portion 4 against the uppermost part of the thread in the hole. This sealing is also of importance for preventing leakage into the hole in the event of different pressures occurring on both sides of the hole.

[0018] Fig. 2 shows a core 7 included in the masking plug 1. Like the masking plug 1, the core 7 also has three main portions. The first portion, viz. the core 8 of the head, corresponds to and is disposed in the head 2. The threaded portion 3 is in its entirety the same as the threaded portion of the masking plug 1. Thus, the core 7 extends a distance out of the transitional portion 4 in a direction away from the head 2 in the finished masking plug 1. Between the core 8 of the head and the threaded portion 3, there is a connecting portion 9 which is disposed inside the transitional portion 4 in the finished masking plug 1. The core 7 is of one piece manufacture and is preferably of one and the same material, which is conductive. This material is most generally a metal.

[0019] The hole 5 extends into the core 8 of the head. The inside of the hole 5 is advantageously provided with transverse grooves or corresponding roughness. It is particularly advantageous if the grooves are in the from of a thread since this permits simple manufacture. The function of the transverse grooves is to increase the friction between the inside of the hole 5 and a suspension device inserted therein so that this does not unintentionally slide out during the painting operation, at the same time as it is a simple matter to remove the ready-painted parts. In the preferred embodiment, there is provided a pair of circumferential grooves 10 along the periphery of the core 8 of the head. These grooves 10 serve the function of increasing the engagement between the head 2 manufactured from a non-conductive material and the core 8 of the head. For the same purpose, the core 8 of the head may also display flattened portions which assist in retaining the head 2 on its core 8. It is particularly important if

the masking plug 1 is to be subjected to severe or repeated mechanical stresses, such as pulling and/or twisting of the plug 1. On the underside of the core 8 of the head, there may similarly be provided an additional circumferential groove or grooves.

[0020] Since the core 8 of the head is connected to the threaded portion 3, this implies that the inside of the hole 5 is also connected to the threaded portion 3. There will thus be obtained a protected, electric communication between a suspension device inserted in the hole 5 via the connecting portion 9 and the threaded portion 3 to the object which is to be painted.

[0021] It is not necessary that the entire core 7 be manufactured from one and the same conductive material, but in general it is simpler from the production engineering viewpoint if this is the case. Nor need the material be the same in the core 7 as in the object to be painted. However, consideration should be paid to aspects which affect the suitability of the materials to cooperate with one another, such as coefficient of longitudinal expansion and mutual placing in the voltage series.

[0022] The connecting portion 9 is narrower than the core 8 of the head and is at least not wider than the threaded portion 3, but could possibly be approximately as wide as it. The reason for this dimensional requirement is that it must be possible to dispose the transitional portion 4 outside the connecting portion 9 so that the sought-for sealing properties against the uppermost turn in the threaded hole are attained.

[0023] Fig. 3 shows a detailed view of the head 2 and the transitional portion 4 with the groove 6. In the preferred embodiment, the part which is shown in Fig. 3 is of one piece manufacture in a non-conductive material, preferably one and the same material, even though it is conceivable to utilise, for example by double spraying, two or more materials. The Figure shows how the hole 5 in the head 2 is gently bevelled at its upper edge in order to facilitate the insertion of the suspension device or hook therein. The hole 5 then continues downwards in the core 8 of the head. The core 8 of the head and the connecting portion 9 are also shown by broken lines.

[0024] Fig. 4 shows those parts that are illustrated in Figs. 2 and 3 combined to form a unit. In manufacture in practice, the parts are normally not manufactured individually for subsequent assembly, but the head and the transitional portion 4 are disposed on the core 7 for example by injection moulding or casting.

[0025] It may be particularly observed how the hole 5 first extends through the non-conductive material in the head 2 and downwards in the core 8 of the head which consists of a conductive material, in order to terminate a distance down in the connecting portion 9. A conductive suspension device inserted in the hole 5 will thus be in electric contact via the core 7 with the object to be painted. The hole 5 preferably displays a portion of smaller diameter which extends through the non-conductive material and a portion of slightly larger diameter in the core 8 of the head. As a result, the inside of the hole 5 is further protected from washing liquid, paint and the like.

[0026] The core 7 being electrically conductive, it will attract the paint powder on powder painting. At the same time, the head 2 of the non-conductive material has a repellent effect as was mentioned in the introduction to the description. The masking plug 1, its head 2 and the core 7 are together dimensioned so that the attracting and repelling effects balance one another out and the effects from the purely geometric shadowing of the head 2 so that the problems mentioned by way of introduction involving rampart formations around the holes are obviated.

[0027] Fig. 5 shows in perspective the above-described masking plug 1 with the screening washer 11 as was previously mentioned. The screening washer 11 is mounted in the groove 6, preferably by snap action. The screening washer 11 screens off a larger area than the head 2 of the plug 1 and its transitional portion 4 alone are capable of doing. Such a larger screening-off is particularly to be sought for if the hole is to be utilised for a bolt union with one or more interlaying washers and it is important that the interlaying washers have as smooth a substrate as possible. Moreover, the problem that a subjacent paint layer is worn off and the bolt union will thereby become insufficiently tightened or even come loose is thereby eliminated. The screening washer 11 has a through-going opening 12 in which the transitional portion 4 of the masking plug is insertable. At the upper end of the through-going opening 12, there is some form of projection which is complementary to the groove 6 on the masking plug 1 so that the screening washer 11 may be snapped therein.

[0028] The screening washer 11 has the outer configuration of a truncated cone in the preferred embodiment. Its extent in the vertical direction is substantially of the same order of magnitude as the extent of the transitional portion 4 in the vertical direction. This implies that the threaded portion 3 is still free and may therefore be screwed into the object to be painted. If the material in the screening washer 11 is sufficiently elastic, a certain further extent in the downward direction may be permitted which results in the abutment between the object to be painted and the screening washer 11 being particularly tight, since the latter is slightly deformed when the masking plug 1 is completely screwed in.

[0029] Fig. 6 is a schematic view of the washer 11 from the side. The through-going opening 12 through the washer 11 is shown by broken lines and also its complementary form at the upper portion.

DESCRIPTION OF ALTERNATIVE EMBODIMENTS

[0030] The present invention may naturally be varied with respect to both the geometry and the selection of the materials included. However, a common feature is that the threaded portion 3 and the remainder of the core 7 must be manufactured from a conductive material, while the superjacent head 2 and the transitional portion

4 must be manufactured from a non-conductive material.

[0031] Mounting of the screening washer 11 has been disclosed as taking place by securement in a separate groove 6. It is naturally possible, for example, by providing the washer 11 with a purely frictional mounting on the transitional portion 4.

[0032] The present invention may be varied further provided these variations are not departing from the scope of protection solely defined by the appended Claims.

Claims

1. A plug (1) for masking a threaded hole in spray painting or powder painting, comprising a threaded portion (3) for threading in the hole, the threaded portion (3) being manufactured from an electrically conductive material, **characterised in that** a head (2) of a non-conductive material is disposed at the one end of the threaded portion (3) for screening-off the hole and its threads.

2. The plug (1) as claimed in Claim 1, **characterised in that** the head (2) has a recess (5) for cooperation with a suspension device, the inside of the recess (5) being of an electrically conductive material and being in communication with the threaded portion (3).

3. The plug (1) as claimed in Claim 1 or 2, **characterised in that** the head (2) has a core (8) of an electrically conductive material.

4. The plug (1) as claimed in any of Claims 1 to 3, **characterised in that** the head (2) has a transverse dimension which exceeds the diameter of the threaded portion (3).

5. The plug (1) as claimed in Claim 4, **characterised in that** a sloping transitional zone (4) is disposed between the head (2) and the threaded portion (3).

6. The plug (1) as claimed in Claim 3, **characterised in that** the core (8) of the head (2) is provided with a circumferential groove (10) for improved engagement with the non-conductive material of the head (2) on actuation in the longitudinal direction of the plug (1).

7. The plug (1) as claimed in Claim 3 or 6, **characterised in that** the core (8) of the head (2) displays a circumferential surface with planar portions for improved engagement with the non-conductive material of the head (2) on twisting of the plug (1).

8. The plug (1) as claimed in any of Claims 1 to 7, **characterised in that** a screening washer (11) may be disposed thereon for screening-off an additional area around the hole.

Patentansprüche

1. Stopfen (1) zum Abdecken eines Gewindelochs beim Sprühlackieren oder Pulverlackieren, umfassend einen Gewindeabschnitt (3) um ihn in das Loch zu schrauben, welcher Gewindeabschnitt (3) aus einem elektrisch leitfähigen Material hergestellt ist, **dadurch gekennzeichnet, dass** ein Kopf (2) aus einem nicht leitfähigen Material an dem einem Ende des Gewindeabschnittes (3) angeordnet ist, um das Loch und sein Gewinde abzudecken.

2. Stopfen (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Kopf (2) eine Ausnehmung (5) hat zum Zusammenwirken mit einer Authängungseinrichtung, wobei die Innenseite der Ausnehmung (5) aus einem elektrisch leitfähigem Material besteht und in Verbindung mit dem Gewindeabschnitt (3) steht.

3. Stopfen (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Kopf (2) einen Kern (8) aus elektrisch leitfähigem Material hat.

4. Stopfen (1) nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** der Kopf (2) Querabmessungen aufweist, die den Durchmesser des Gewindeabschnitts (3) überragen.

5. Stopfen (1) nach Anspruch 4, **dadurch gekennzeichnet, dass** eine geneigte Übergangszone (4) zwischen dem Kopf (2) und dem Gewindeabschnitt (3) vorgesehen ist.

6. Stopfen (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** der Kern (8) des Kopfes (2) mit einer Umfangsnut (10) versehen ist, für einen verbesserten Eingriff mit dem nichtleitfähigen Material des Kopfes (2) bei Betätigung in Längsrichtung des Stopfens (1).

7. Stopfen (1) nach Anspruch 3 oder 6, **dadurch gekennzeichnet, dass** der Kern (8) des Kopfes (2) eine Umfangsfläche mit ebenen Abschnitten für einen verbesserten Eingriff mit dem nichtleitfähigen Material des Kopfes (2) beim Drehen des Stopfens (1) aufweist.

8. Stopfen (1) nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** darauf eine Abdeckscheibe (11) angeordnet werden kann, um zusätzlichen Bereich um das Loch abzudecken.

Revendications

1. Obturateur (1) destiné à masquer un orifice fileté pour la peinture par pulvérisation ou la peinture par poudrage, comprenant une partie filetée (3) à visser dans l'orifice, la partie filetée (3) étant réalisée en un matériau électriquement conducteur, **caractérisé en ce qu'**une tête (2) en un matériau non conducteur est disposée à une première extrémité de la partie filetée (3) afin de masquer l'orifice et ses filets.

2. Obturateur (1) selon la revendication 1, **caractérisé en ce que** la tête (2) comporte une cavité (5) destinée à coopérer avec un dispositif de suspension, l'intérieur de la cavité (5) étant en un matériau électriquement conducteur et étant en communication avec la partie filetée (3).

3. Obturateur (1) selon la revendication 1 ou 2, **caractérisé en ce que** la tête (2) comporte un noyau (8) en un matériau électriquement conducteur.

4. Obturateur (1) selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** la tête (2) présente une dimension transversale qui excède le diamètre de la partie filetée (3).

5. Obturateur (1) selon la revendication 4, **caractérisé en ce qu'**une zone de transition inclinée (4) est disposée entre la tête (2) et la partie filetée (3).

6. Obturateur (1) selon la revendication 3, **caractérisé en ce que** le noyau (8) de la tête (2) comporte une rainure circonférentielle (10) afin d'assurer un couplage amélioré avec le matériau non conducteur de la tête (2) lors de l'application dans la direction longitudinale de l'obturateur (1).

7. Obturateur (1) selon la revendication 3 ou 6, **caractérisé en ce que** le noyau (8) de la tête (2) présente une surface circonférentielle avec des parties planes afin d'assurer un couplage amélioré avec le matériau non conducteur de la tête (2) lors de la torsion de l'obturateur (1).

8. Obturateur (1) selon l'une quelconque des revendications 1 à 7, **caractérisé en ce qu'**une rondelle de masquage (11) peut être disposée dessus afin de masquer une zone supplémentaire autour de l'orifice.

Fig 1

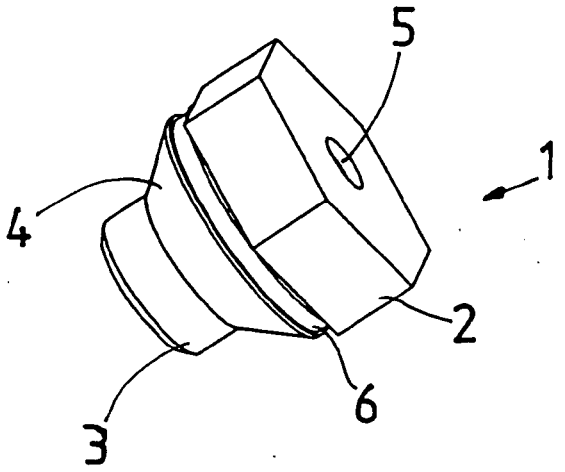


Fig 2

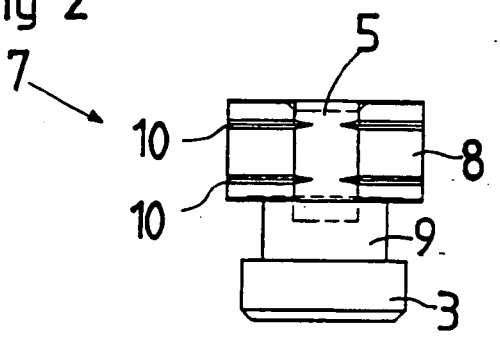


Fig 3

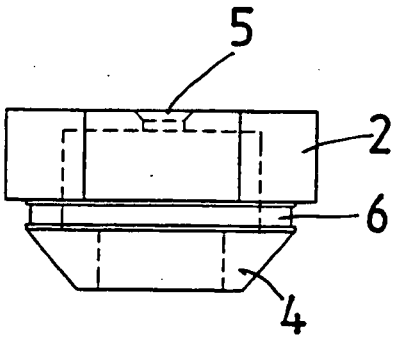


Fig 4

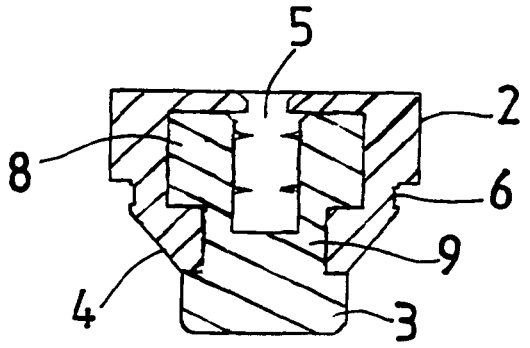


Fig 5

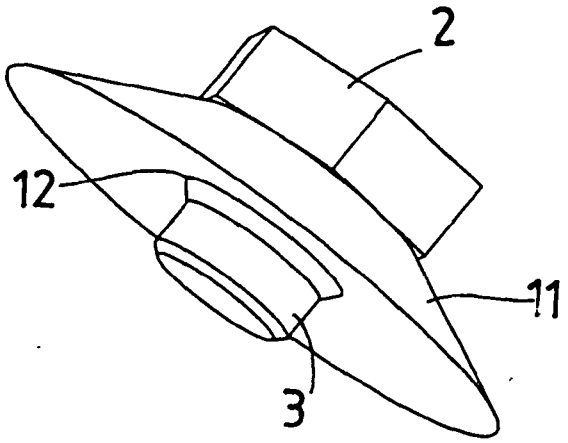
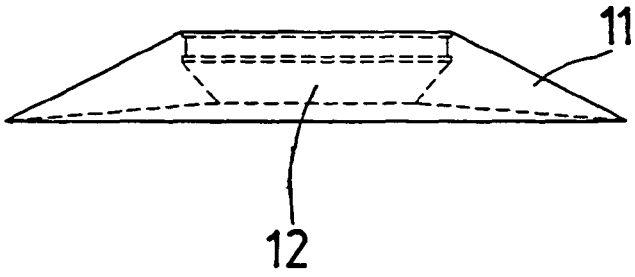


Fig 6



REFERENCES CITED IN THE DESCRIPTION

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