(54) Device for covering the jaws of a vice

The present invention relates to a detachable device (1) for covering jaws (100,100') of vice (10). Said device comprises:
- a jaws covering member (400,400') provided with a jaws covering portion (401,401') interposed between said jaws and the object to be locked; and
- vice fastening means (200,200') separated from, and connected to, said jaws covering member by connection means (300,300');

The vice fastening means comprise at least a permanent magnet (210,210') suitable to be magnetically coupled to any part of said vice within the extension of said connection means.

FIG. 1A
The present invention relates to a device suitable for vices, or similar tools, to lock objects to be worked. In particular, the present invention relates to a device suitable for covering jaws of vice, capable of clamping and retaining workpieces being worked.

Mechanical vices are devices capable of clamping and retaining an object to be worked, particularly during mechanical working operations. These have at least two elements, called jaws, which, when are placed mutually opposite, lock the object by mechanical interference. The elements forming a vice, including the jaws, are usually made of metal material, such as cast iron or steel. To avoid damaging on the clamped object, especially when it is made of a material softer than that of the vice, the jaws are usually covered with plates of soft metal, such as copper, light alloys or lead. The need for this covering is even more evident when the jaws have a knurled portion. In fact, this facilitates grip of the object but can, at the same time, cause serious deformations, thus ruining the exterior shape of the object.

The coatings of the jaws are formed to be detachable, so that they can be used only when the object to be clamped requires this. Therefore, it is necessary to use covering devices that allow the adhesion to the jaws during working and which can be easily removed when they are not needed. Several devices for covering jaws of vice are known. Some use, as means for coupling with the jaws, magnetic or adhesive elements which can subsequently be easily removed.

In one embodiment, adhesive material is applied both to the device and to the jaws to be covered. A further embodiment provides for the use of a magnetic material applied to the jaws to be covered, by means of adhesives or epoxy resins, and of ferrous material applied to the leather cover to obtain the coupling.

This solution has the evident disadvantage of the difficulty of applying the covering. The use of glues is onerous both economically and in relation to the time spent to apply them. Moreover, the manual operations required for the positioning of the device make the application thereof difficult.

FR 2619040 describes a device with magnetic gaskets to protect the jaws of a vice or similar devices. In particular, the device comprises an element in light alloy provided with slots inside where permanent magnets are housed, covered by overmoulding thereof. The light alloy element has a surface in contact with the objects to be clamped and the opposite surface in contact with the jaws of the vice. The grip between the device and the jaws is guaranteed by the permanent magnet buried in the light alloy element with the ferrous material of the jaws.

This solution ensures improved and more rapid application. However, it has the disadvantage of requiring permanent magnets sufficiently large to ensure coupling in the presence of the light alloy element. Moreover, a further disadvantage is the impossibility of re-utilizing the device in the case that the permanent magnets lose their magnetic characteristics over the time.

US 2666352 describes a device made of resilient material for covering jaws, provided with magnetic inserts. In particular, the resilient material comprises rubber or plastics provided with housings for permanent magnets.

Therefore, this solution ensures interchangeability of the magnets in case of wear and/or breakage thereof. However, it has the disadvantage that it does not ensure stability during normal locking operations.

Although the devices of the prior art disclose the use of permanent magnets, the devices are not able to ensure, at the same time, ease of application and stability of use. In fact, after a greater or lesser period of work, these devices are not able to maintain coupling. This is, above all, due to the detachment of the magnetic parts or to wear thereof.

It would therefore be desirable to have a device for covering the jaws of vices or the like capable of ensuring easy and rapid application to these same jaws. It would be desirable for said device to be able to improve the ergonomics of the workplace and minimize stress caused by continuous bending of the operator.

It would also be desirable for said device to be capable of ensuring stability during the operating and idle phases. It would also be desirable that the production process were less expensive than the known process, in particular by minimizing the costs relating to the number of components, their assembly and their interaction. Finally, it would be desirable for this device to be capable of ensuring a long working life and the possibility of subsequent reconditioning operations.

An object of the present invention is thus to provide a device that is capable of minimizing or eliminating problems deriving from detachment of the covering from the jaw to which it is applied, hence obtaining an effective increase in the ergonomics of the workplace.

A further object of the present invention is to provide a device capable of reducing the stress of the operator caused by continuous bending to pick up the covering in the event of accidental drop.

Yet another object of the invention is to provide a device comprising a minimum number of parts, and therefore at reduced production and assembly cost. Moreover, another object of the present invention is to provide a device that allows prolonged use in time, as well as the possibility of subsequent reconditioning operations, making it economical to use.

These objects are achieved by a detachable device for covering jaws of vice, comprising:
- a jaws covering member comprising a jaws covering portion interposed between said jaws and the object to be locked; and
- vice fastening means separated from, and connected to, said jaws covering member by connection means;

characterized in that said vice fastening means comprise at least a permanent magnet suitable to be magnetically coupled to any part of said vice within the extension of said connection means.

[0020] In the device according to the invention the jaws covering member is subject to compression stresses during locking of the objects, but no compression stress is exerted on the vice fastening means, which are used only for fixing the jaws covering member to the surface of the vice.

[0021] Furthermore, the vice fastening member, being connected to the jaws covering member, allow the ergonomics of the workplace to be improved, as the operator can adopt a convenient working position during the whole time in which the vice is used. Moreover, the device according to the invention allows to minimize the stress deriving from bending of the operator during repositioning of the device in the case of detachment.

[0022] The use of a permanent magnet facilitates the coupling of the device with the jaws. In particular, the device is easy to apply, making rapid removal and/or attachment possible without the use of tools.

[0023] The possibility to couple the device to any part of said vice within the extension of the connection means permits to freely move the vice fastening means, in a predetermined space. It is thus possible to avoid that the vice fastening means interfere with the jaws and to prevent to damage the permanent magnet when the jaws covering member is subject to a tension, like the compression force.

[0024] Furthermore, by detaching the covering member from the vice fastening means in an independent manner, it is possible to change the damaged parts at lower cost.

[0025] Preferably, the vice fastening means consist of a permanent magnet. In this way, the coupling between the jaws covering member and the vice is simple and rapid.

[0026] Preferably, the connection means comprise at least an elongated and/or flexible element to vary the mutual positioning of the jaws covering member and/or the jaws covering portion and the vice fastening means. The elongated and/or flexible element forming the connection means allows to couple the permanent magnet to any part of said vice (10) within the extension of said elongated and/or flexible element. Even more preferably, the connection means comprise at least a chain. In this way a stable but flexible connection is established between the jaws covering member and the vice fastening means. The elongation or flexible element allows a quick and simple application to any configuration of vice. Furthermore, it simplifies to place them in an appropriate point, avoiding that they interfere with the jaws. Moreover, the connection with an elongated element allows to move the jaws covering member away from the jaws, thus maintaining the connection point of the device with the vice for further applications.

[0027] Preferably, the jaws covering portion comprises at least a contact portion with the jaws and at least a gripping portion for the object, opposite to the contact portion. Even more preferably, the jaws covering member further comprises at least a support portion obtained from the extension of the contact portion and/or of the gripping portion. The support portion is operatively connected with the connection means, thus allowing improved stability during application.

[0028] Preferably, the section of the jaws covering member has an L shape, formed on one side by the contact portion and/or the gripping portion, and on the perpendicular side by the support portion. In this way, additional stability is ensured for application on jaws having parallelepiped or similar shape.

[0029] Further characteristics and advantages of the present invention will be more apparent from the description of preferred embodiments, illustrated by way of non-limiting example in the accompanying figures, wherein:

- Fig. 1A is an overall perspective view of a first embodiment of the device according to the present invention;
- Fig. 1B is an exploded perspective view of a first embodiment of the device according to the present invention;
- Fig. 2 is a perspective view of a bench vice comprising the device in the embodiment represented in Figs. 1A and 1B;
- Fig. 3 is a side plan view of the vice represented in Fig. 2; and
- Fig. 4 is a sectional view according to A-A of the vice represented in Fig. 3.

[0030] Hereunder, reference will be made to the use of a device according to the present invention applied to a vice comprising two symmetrical and opposite jaws with an approximately parallelepiped shape.

[0031] With reference to the aforesaid figures, an embodiment of the detachable device 1 for covering jaws 100, 100′ of vice 1, according to the present invention, comprises a jaws covering member 400, 400′, provided with a jaws covering portion 401,401′, vice fastening means 200, 200′ and connection means 300, 300′. These latter form a solid connection between the jaws covering member 400, 400′ and the vice fastening means 200, 200′, as described below, while maintaining them separated.

[0032] In the present embodiment, illustrated in the accompanying figures, the jaws covering member 400, 400′ is made of light metal alloy, such as aluminium, by an extruded section bar extending for the same length as
the jaws to be covered. The jaws covering portion 401,401' comprises contact portions 410, 410', designed to ensure adhesion with the operating portion of the jaws 100, 100', and grip portions 420, 420', providing the contact surface with the object to be clamped. In particular, the grip portions 420, 420' are provided with teeth along the whole surface, suitable to increase the friction for gripping the object to be clamped. Alternatively, the surface can be provided with knurling, or similar machining, or can have a smooth plane. Therefore, the grip portions 420, 420' replace the operating portions of the jaws 100, 100'.

[0033] The term operating portions is intended, in the present description, as the portions of jaws in contact with the object to be clamped, when these are not provided with further protections. In a further embodiment, the grip portions 420, 420' are formed, at least partly, by materials different than metal, such as rubber or plastics of any kind, capable of deforming to absorb, at least in part, the compression stress imposed by opposition of the jaws 100, 100'.

[0034] The jaws covering member 400, 400' further comprises a support portion 430, 430'. The support portion is obtained from the extension of the contacting portions 410, 410' and of the grip portions 420, 420', as part of the jaws covering portion (401, 401').

[0035] Moreover, in this embodiment, the section of the jaws covering member 400, 400', formed by the contacting portions 410, 410', the grip portions 420, 420' and the support portions 430, 430', has an L shape. In particular, a first side of said L is formed by the jaws covering portion 401, 401', and so by the contacting portions 410, 410' and by the gripping portions 420, 420' placed symmetrically, while the perpendicular side of the L is formed by the support portions 430, 430'.

[0036] Alternatively, the jaws covering member 400, 400' can have any section suitable to ensure an effective coupling with the profile of the jaws 100, 100'.

[0037] The vice fastening means 200, 200' comprise permanent magnets 210, 210' having a cylindrical shape, or any other suitable shape.

[0038] Finally, the connection means 300, 300' are constituted by elongated and flexible elements. In particular, these elements are constituted by a chain made of metal material, preferably steel. Alternatively, the connection means 300, 300' can be formed by any element capable of spacing apart the jaws covering member 400, 400' from the vice fastening means 200, 200', although ensuring a solid connection with the possibility of modifying the mutual positioning. In the embodiment here described, in particular, the chain has one end coupled with the jaws covering member 400, 400' and the opposite end coupled with the permanent magnets 210, 210'. In particular, coupling of the chain with the jaws covering member 400, 400' is obtained by an operative connection at the support portion 430, 430'.

[0039] The vice fastening means 200, 200' of the device 1 to the vice 10 are separated from, and connected to, the jaws covering member 400, 400', by connection means 300, 300'. In particular, the vice fastening means 200, 200' are operatively coupled to the vice 10 by the force of attraction obtained by moving the permanent magnets 210, 210' toward the metal body of the vice 10. As illustrated in Figs. 2-4, this coupling is effected by placing the permanent magnets 210, 210' on the metal body of the vice 10. This ensures safe coupling of the vice fastening means 300, 300' to the vice 10, while simultaneously spacing these fastening means from the operating portions of the jaws 100, 100'. This makes it possible to avoid subjecting the vice fastening means 300, 300' to mechanical stresses during clamping. Therefore, the permanent magnets 310, 310' have an extended life cycle, avoiding premature breakage, given the fragility of the ferromagnetic material.

[0040] The jaws covering member 400, 400' is placed on the jaws 100, 100' of the vice 10 so as to form a protective covering of the operating portions. The contact portions 410, 410' and the grip portions 420, 420' are interposed between the jaws 100, 100' of the vice 10 and the object to be locked.

[0041] The chain, coupling at one end the jaws covering member 400, 400' and at the other end the permanent magnets 210, 210', ensures a solid and flexible connection. This makes it possible to vary the mutual positioning between the jaws covering means 400, 400' and the vice fastening means 200, 200' in relation to the operator's needs and/or to the configuration of the body of the vice 10.

[0042] The device 1 is therefore mounted on the vice 10 when required, as in the case of objects to be worked which are delicate or made of soft material. The jaws 100, 100' are covered, at least partly, by the jaws covering member 400, 400'. The permanent magnets 210, 210' are therefore placed on the body of the vice 10, spaced from the operating portion of the jaws 100, 100'. The support portions 430, 430' are placed on the upper portion of the jaws 100, 100', perpendicular to the operating portions.

[0043] The operator is therefore capable of clamping and positioning the objects without subjecting the permanent magnets 210, 210' to any stress.

[0044] At the end of the operations to be carried out on the object, the compression stress imposed by the jaws 100, 100' is removed. The device 1 maintains the position on the jaws 100, 100' due to the shape of the section of the jaws covering member 400, 400'. In the event that the operator accidentally hits the device 1, this is maintained in connection with the vice 10 by to the action of the permanent magnets 210, 210'. This prevents accidental detachment and fall. It is also reduced the working stress of the operator caused by continually bending to pick up the jaws covering member from the ground, in the event of detachment and consequent falling.

[0045] For removing the device 1 the operator simply de-couples the permanent magnets 210, 210' from the
vice 10 by applying a force to overcome the force of attraction exerted by the magnets. Subsequently, the operator completes removal of the device 1 by detaching the jaws covering member 400, 400' applied previously.

The detachable device for covering jaws according to the present invention is therefore highly flexible, allowing it to be coupled to, and detached from, a vice with a few simple operations. This ensures a greater operating speed in relation to the operator’s specific needs. Moreover, the possibility of mounting and removal without the aid of tools allows it to be used in any condition.

The possibility of easy modification of the geometry, without altering the structure required for a correct operation, makes it possible to design a device according to the configuration desired capable of adapting to jaw profiles that differ even greatly.

The possibility of modifying the geometry without altering the structure required for a correct operation, makes it possible to design a device according to the configuration desired capable of adapting to jaw profiles that differ even greatly.

The detachable device for covering jaws according to the invention allows to achieve an effective increase in the ergonomics of the workplace. In fact, it allows a reduction of the stress caused by continuous bending of the operator to pick up the covering in the event of accidentally drop.

A device obtained according to the present invention also allows to maximize the components to be used in the manufacture of the device, as well as the production costs associated therewith thanks to the minimum number of necessary parts and operations for their assembly. In fact, cutting or remelting operations are not required to perform burying or coupling between the jaws covering member and the permanent magnets.

The description, provided with reference to a vice comprising two symmetrical opposite jaws, can also be extended to vices comprising any number of jaws. Further, the present invention can also be applied to jaws of different shapes and dimensions, by suitably modifying the configuration and size of its elements and maintaining the same inventive concept.

Claims

1. Detachable device (1) for covering jaws (100, 100') of vice (10), comprising:

   - a jaws covering member (400, 400') comprising a jaws covering portion (401, 401') interposed between said jaws (100, 100') and the object to lock, and

   - vice fastening means (200, 200') separated from, and connect to, said jaws covering member (401, 401') by connection means (300, 300').

2. Detachable device (1) for covering jaws (100, 100') of vice (10) according to claim 1, characterized in that said vice fastening means (200, 200') consist of a permanent magnet (210, 210').

3. Detachable device (1) for covering jaws (100, 100') of vice (10) according to claim 1 or 2, characterized in that said connection means (300, 300') comprise at least an elongated and/or flexible element to vary the mutual position between said jaws covering member (400, 400') and/or said jaws covering portion (401, 401'), and said vice fastening means (200, 200'), said elongated and/or flexible element allowing that said permanent magnet (210, 210') is coupled to any part of said vice (10) within the extension of said elongated and/or flexible element.

4. Detachable device (1) for covering jaws (100, 100') of vice (10) according to claim 3, characterized in that said connection means (300, 300') comprise at least a chain.

5. Detachable device (1) for covering jaws (100, 100') of vice (10) according to one or more of claim from 1 to 4, characterized in that said jaws covering portion (401, 401') consists at least a contact portion (410, 410') with said jaws (100, 100') and at least a grip portion (420, 420') for said object opposite to said contact portion (410, 410').

6. Detachable device (1) for covering jaws (100, 100') of vice (10) according to claim 5, characterized in that said jaws covering member (400, 400') comprises at least a support portion (430, 430') obtained from the extension of said contact portion (410, 410') and/or of said grip portion (420, 420'), said support portion (430, 430') being operatively connected with said connection means (300, 300').

7. Detachable device (1) for covering jaws (100, 100') of vice (10) according to claim 6, characterized in that the section of said jaws covering member (400, 400') has an L shape; said L shape being formed on one side by said contact portion (410, 410') and/or said grip portion (420, 420') and on a perpendicular side by said support portion (430, 430').
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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