(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 278 324 B1**

(12) # EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **21.07.93** (51) Int. Cl.5: **B25H 3/04**

(21) Application number: **88101146.4**

(22) Date of filing: **27.01.88**

(54) **A rack for housing and transporting tools,in particular for numerically controlled machines.**

(30) Priority: **12.02.87 IT 2081087 U**

(43) Date of publication of application:
17.08.88 Bulletin 88/33

(45) Publication of the grant of the patent:
21.07.93 Bulletin 93/29

(84) Designated Contracting States:
CH DE ES FR GB LI SE

(56) References cited:
EP-A- 0 174 455
FR-A- 2 331 240
GB-A- 1 595 041
GB-A- 2 165 744
US-A- 1 755 897
US-A- 4 535 897

(73) Proprietor: **SUSTA S.p.A.**
Via delle Industrie
I-20040 Cavenago Brianza (Milan)(IT)

(72) Inventor: **Ratti, Mario**
5, Piazza Immacolata
I-20091 Bresso Milan(IT)

(74) Representative: **Marietti, Giuseppe**
STUDIO ASSOCIATO MARIETTI & PIPPARELLI
Viale Caldara 38
I-20122 Milano (IT)

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

Rank Xerox (UK) Business Services
(3.10/3.6/3.3.1)

Description

The invention relates to a rack of the type defined in the pre-characterising portion of Claim 1 for the housing, transport and presentation of machine tools.

The pre-characterising portion of Claim 1 is based on the disclosure of the document US-A-4155460.

At present there exist various types of holders for machine tools, all designed to be flexible, easy to use and, above all, usable by numerically controlled machines. The most serious problems stem from the last; indeed, in this type of machine the tools are removed from the rack by a robot arm, which is programmed to "recognize" each single tool from its position relative to a certain fixed reference, and to remove and replace the chosen tool in its proper position.

Since the maximum tolerated deviation from the programmed position is about 0.2 mm, the obvious problem is the presentation of the tool to the mechanical arm in exactly that position for which the arm is programmed.

Assuming that the position of the rack is fixed exactly with respect to the machine, it is obvious that every tool must not only occupy the same position in the rack, but must be kept firmly in that position, being allowed to move only along its longitudinal axis, when moved by the mechanical arm. At the same time, it should also be possible to use the same rack for changing the tools.

Among the various solutions proposed, that presented in the Italian Utility Model No.20827-B/77 and in the US-A-4155460, both in the applicant's name, offers the best solution to the problems described above.

In those patents a rack is proposed of the type referred to, consisting of an essentialy rectangular frame with a pair of longerons and a pair of transversals which define an internal cavity in which are interchangeably housed tool-holders for the tools. Each holder presents a squared frame, two sides of which bear on and between the two longerons, while from lower on the bearing sides there extend fixing devices which project and engage onto various holes, chosen at will, among a number of holes in the surface of the longerons on which the tool holder bears.

In this way, knowing on which holes the tool-holder will be located, it is possible to position each holder and thus each tool precisely and repetitively.

The stability of each holder is obtained both from the shape of its own frame, which extends partially into the cavity between the longerons, following for some distance downwards the shape of the longeron internal walls, and from the use of locking elements consisting of L-sections applied to the longerons and bearing against the sides of the holders, guaranteeing that the holders remain in position during the movement of the tools. The locking elements are either bolted to the longerons or locked on by a pin engaging in a "keyhole" shaped slot.

Bolts guarantee the complete immobility of the rack (and thus of the tool), but require too much time to release the L-sections during changing of the holder, while the engagement of a locking pin in a shaped slot, even where it is further blocked by a spring lock, allows a certain play of the holder, which is decidedly undesirable.

An alternative locking system has been developed by the Swiss firm Lista; in this system the tool-holders, after being positioned on the frame, are locked by snap-activated hooks on the holders themselves to the underside of the longerons. This system has proved to be effective only for a limited period of time, after which the wear caused by the removal and replacement of the tools leads to stretching of the hooks and to related play in the holders.

There remains, therefore, a need for a method of locking said L-sections to the longerons which gives a secure and complete locking of the holder, and is at the same time easy and quick to unlock.

An object of the present invention is to solve the above mentioned problem and provide a holder-rack for machine tools as defined above, in which the holders are totally locked in position by L-sections which can be quickly and securely fixed to the rack and can be removed from it, without leaving any play.

Accordingly, the present invention concerns a rack for the housing, transport and presentation of machine tools, particularly for numerically controlled machines, capable of being mounted on a support with other or similar racks, said rack being of the type consisting of an elongated rectangular frame composed of two longitudinal longerons and a pair of separate parallel transversals, creating a space in which are interchangeably housed one or more tool holders, each having a rectangular frame adapted to be housed between said longerons and showing side portions which bear on the two longerons, said holders being positioned precisely and the exact positioning being repeatable by means of said holder portions which present projecting locating devices on the lower sides in contact with the longerons, which project and engage on several holes chosen at will from holes in the surface of the longerons on which the holders rest, these last being held fixed by means of locking pieces fitted to the longerons and consisting of L- rolled-sections, characterized in that said sections present at least one bayonet-type locking comprising bayonet

fittings and key holes on the vertical walls of the L-sections and longerons respectively, the key holes having a narrower portion in which the fittings are housed, to precisely position the L-sections in a direction parallel to said vertical walls and perpendicular to said longerons upon locking movement parallel to said longerons.

The rack will now be described in more detail with reference to the attached drawings where:

- figure 1 is an exploded view of a possible embodiment of the invention.
- Figure 2 is a partial cross-section of the rack as shown in figure 1.
- Figure 3 is a side view of a possible embodiment of the bayonet lock and a related snap-stop device.
- Figure 4 is a top view of the snap-stop device.

With reference to figs 1 and 2, a rack is formed by a frame consisting of a pair of longerons 2, 3 and two parallel transversals 4, 5 forming an essentially rectangular space 6.

In the cavity 6 thereof are housed tool-holders 8, each having a rectangular frame 7 forming two supports 9, 10 which are provided on their lower sides with locking devices, in this case pins, 12, which project and engage several holes, chosen at will from holes 11, to position the tool-holder on the surfaces 13, 14 of the longerons 3, 2 on which rest the supports 9, 10 of tool-holder 8. The tool-holder 8 may, in the case illustrated in fig.1, present on one of the sides of the frame 7 a tooth or protuberance 8', integral with the tool-holder 8, for centering the flange of the tool, which carries a seat corresponding to the tooth 8', when that tool is being housed in said tool-holder 8.

As previously mentioned, this system allows the tool and tool-holder to be changed while retaining the same rack, thus reducing the size of the rack store; then, knowing with which holes the pins have to engage, it is possible to repeat the original position of the tools, i.e. the order in which they were arranged and their position on the rack before being substituted by other tools, with the complete and total precision required by the small tolerances allowed by mechanical arms.

Always referring to figs. 1 and 2, the tool-holder 8 is locked in position by two L-sections 15, 16 each provided near its ends with bayonet fittings 18.

On the longerons 2 and 3 are the corresponding holes 19. Obviously, the holes 19 and fittings 18 correspond exactly in terms of size and location, to form a very precise lock upon insertion with a relative motion in a longitudinal direction. This movement exactly places the fittings 18 on the key-hole narrower portion.

To prevent accidental separation of the L-sections, a stop device is provided for, which is illustrated in more detail in figs. 3 and 4.

On the internal part of the vertical part of the longerons 2, 3 is a metal tongue 20, one end of which is secured to the longeron itself, while the other end, which is "U" shaped, projects through a first hole 21 in the longerons to a second hole 22 in the corresponding section, thus preventing any lateral movement of the section in question.

Pressing on the "U" shaped part unlocks the holes 22 and allows the sections 15, 16 to slide and release the tool-holder 8.

The rack 1 may be fixed to any support, as for example, a trolley, by any known means; in a preferred embodiment the transversals 4 and 5 present at least two holes for bolting the rack 1 to a rack and thus obtaining a rigid structure.

In the preferred embodiment shown in figs. 1 and 2, each transversal presents six holes 23 to locate the rack as preferred; using two at a time, the rack 1 may be anchored securely, preventing movements on the level or when inclined, there being more inclined positions available depending on the holes used, each position being fixed and repeatable.

From what is above stated, it is obvious that the invention provides a rack for machine tools in which the bayonet fitting on the L-sections and the snap-stop allow easy locking of the tool-holders, and equally quick and easy unlocking, while locking the tool-holders with great precision and, above all, with that demanded by the requirements of numerically controlled machines.

Claims

1. A rack (1) for the housing, transport and presentation of machine tools, particularly for numerically controlled machines, capable of being mounted on a support with other or similar racks, said rack being of the type consisting of an elongated rectangular frame composed of two longitudinal longerons (2, 3) and a pair of separate parallel transversals (4, 5), creating a space (6) in which are interchangeably housed one or more tool holders (8), each having a rectangular frame (7) adapted to be housed between said longerons (2, 3) and showing side portions (9, 10) which bear on the two longerons (2, 3), said holders (8) being positioned precisely and the exact positioning being repeatable by means of said holder portions (9, 10) which present projecting locating devices (12) on the lower sides in contact with the longerons (2, 3), which project and engage on several holes (11) chosen at will from holes in the surface of the longerons (2, 3) on which

the holders rest, these last being held fixed by means of locking pieces (15, 16) fitted to the longerons (2, 3) and consisting of L- rolled-sections, characterized in that said sections (15, 16) present at least one bayonet-type locking comprising bayonet fittings (18) and key holes (19) on the vertical walls of the L-sections (15, 16) and longerons (2, 3) respectively, the key holes (19) having a narrower portion in which the fittings (18) are housed, to precisely position the L-sections (15, 16) in a direction parallel to said vertical walls and perpendicular to said longerons (2, 3), upon locking movement parallel to said longerons.

2. A rack according to Claim 1, characterized in having at least two bayonet fittings (18), one near each end of the related longeron (2, 3).

3. A rack according to Claim 1, characterized in having a longitudinal stop for said L-sections (15, 16) consisting of at least one snap-stop device (20) fixed to the inside of each longeron (2, 3) and projecting with a part directly accessible through two holes (21, 22) in the longeron (2, 3) and in the L-section (16, 15), said holes being aligned when the L-section (15, 16) is in its locked position.

4. A rack according to claim 1, characterized in that said transversals (4, 5) have a number of holes (23) to allow the rack to be bolted to a trolley or any other essentially rigid supporting structure.

5. A rack according to claim 4, characterized in that said holes (23) are arranged in two arcs, said holes being used two at a time to fix the rack (1) securely and stably both on the level and when inclined - there being more inclined positions available, depending on the holes used - every position being defined, stable and reproducible later.

Patentansprüche

1. Gestell (1) zur Aufnahme, zum Transport und zum Präsentieren von Werkzeugen, insbesondere für NC-Werkzeugmaschinen, das fähig ist, an einer Halterung mit anderen oder gleichartigen Gestellen angebracht zu werden, wobei das Gestell von dem Typ ist, der aus einem langen Rechteckrahmen besteht, der aus zwei in Längsrichtung verlaufenden Längsträgern (2, 3) und einem Paar von separaten parallelen Querträgern (4, 5) zusammengesetzt ist, so daß ein Zwischenraum (6) gebildet ist, in dem ein oder mehr Werkzeughalter (8) auswechselbar aufgenommen sind, von denen jeder einen Viereckrahmen (7) hat, der ausgebildet ist, um zwischen den Längsträgern (2, 3) aufgenommen zu werden, und Seitenabschnitte (9, 10) aufweist, die auf den beiden Längsträgern (2, 3) aufliegen, wobei die Halter (8) präzise positioniert sind und die exakte Positionierung mit Hilfe der Halterabschnitte (9, 10) wiederholbar ist, die vorspringende Positionierelemente (12) an den Unterseiten aufweisen, die mit den Längsträgern (2, 3) in Berührung sind und die in diverse Löcher (11) eingreifen, die willkürlich aus Löchern in der Oberseite der Längsträger (2, 3), auf denen die Halter aufliegen, gewählt sind, wobei die letzteren durch Arretierstücke (15, 16) fixiert gehalten sind, die an die Längsträger (2, 3) angesetzt sind und aus L-Walzprofilen bestehen, dadurch gekennzeichnet, daß die Profile (15, 16) mindestens eine Arretierung vom Bajonett-Typ aufweisen, die Bajonettverschlüsse (18) und Schlüssellöcher (19) an den vertikalen Wänden der L-Profile (15, 16) bzw. der Längsträger (2, 3) aufweist, wobei die Schlüssellöcher (19) einen engeren Bereich haben, in dem die Verschlüsse (18) aufgenommen sind, um die L-Profile (15, 16) bei einer Arretierbewegung parallel zu den Längsträgern in einer Richtung parallel zu den vertikalen Wänden und senkrecht zu den Längsträgern (2, 3) präzise zu positionieren.

2. Gestell nach Anspruch 1, dadurch gekennzeichnet, daß es mindestens zwei Bajonettverschlüsse (18) hat, und zwar jeweils einen nahe jedem Ende des zugehörigen Längsträgers (2, 3).

3. Gestell nach Anspruch 1, dadurch gekennzeichnet, daß es einen Längsanschlag für die L-Profile (15, 16) hat, der aus mindestens einer Schnapp-Anschlageinrichtung (20) besteht, die an der Innenseite jedes Längsträgers (2, 3) festgelegt ist und mit einem direkt zugänglichen Teil durch zwei Löcher (21, 22) in dem Längsträger (2, 3) und in dem L-Profil (16, 15) ragt, wobei die Löcher ausgefluchtet sind, wenn sich das L-Profil (15, 16) in seiner Arretierposition befindet.

4. Gestell nach Anspruch 1, dadurch gekennzeichnet, daß die Querträger (4, 5) eine Reihe von Löchern (23) haben, um zuzulassen, daß das Gestell an einem Wagen oder irgendeiner anderen im wesentlichen starren Tragkonstruktion verschraubt wird.

5. Gestell nach Anspruch 4, dadurch gekennzeichnet, daß die Löcher (23) auf zwei Bogen

angeordnet sind, wobei jeweils zwei Löcher gleichzeitig verwendet werden, um das Gestell (1) sicher und stabil sowohl in der Horizontalen als auch in Schräglage zu fixieren - wobei in Abhänggigkeit von den verwendeten Löchern mehr Schrägpositionen verfügbar sind -, wobei jede Position definiert, stabil und später reproduzierbar ist.

Revendications

1. Râtelier (1) pour le logement, le transport et la presentation d'outils pour machines-outils, en particulier pour des machines-outils à controle numerique, qui peut etre logée sur un support avec des autres râteliers ou similaires, ledit râtelier étant du type comprenant un chassis rectangulaire formé par deux longerons (2,3) et deux entretoises separées et parallèles (4,5) qui créent un espace (6) dans lequel un ou plusieurs porteoutils (8) sont logés de façon interchangeable, chaque porteoutil ayant un chassis réctangulaire (7) apte à etre logé entre lesdits longerons (2,3) et ayant des parties laterales (9,10) qui s'appuient sur les deux longerons (2,3), lesdits porteoutils (8) étant logés avec précision et la position exacte étant réproducible par l'entremise desdites parties (9,10) des porteoutils qui ont des dispositifs en saillie de positionnement (12) sur les cotés inférieurs en contact avec les longerons (2,3), qui font saillie et s'engagent avec des trous (11) choisis à volonté parmi une pluralité de trous sur la surface des longerons (2,3) sur laquelle s'appuient les porteoutils, ces dérniers étant maintenus fixes par des pièces de blocage (15,16) montées sur les longerons (2,3) et formées par des profilés en L, caracterisé en ce que lesdits profilés (15,16) presentent au moins un blocage à baionnette comprenant des saillies à baionnette (18) et des trous en forme de serrure (19) sur les parois verticales des profilés en L (15,16) et sur les longerons (2,3), respectivement, les trous en forme de serrure (19) ayant une partie plus étroite dans laquelle sont logées les saillies (18), pour positionner exactement les profilés en L (15,16) dans une direction parallèle auxdites parois verticales et perpendiculaire auxdits longerons (2,3), à la suite d'un mouvement de blocage parallèle auxdits longerons.

2. Râtelier sèlon la revendication 1, caracterisé en ce qu'il presente au moins deux saillies à baionnette (18), chacune près de chaque extremité du longeron (2,3) relatif.

3. Râtelier sélon la revendication 1, caracterisé en ce qu'il presente un arret longitudinal pour lesdits profilés en L (15,16) dans la forme d'au moins un dispositif d'arrêt à déclenchement (20) fixé à l'interieur de chaque longeron (2,3) et saillant avec une partie directement accessible à travers deux trous (21,22) dans le longeron (2,3) et dans le profilé en L (16,15), lesdits trous étant alignés quand le profité en L (15,16) se trouve dans sa position de blocage.

4. Râtelier sélon la revendication 1, caracterisé en ce que lesdites entretoises (4,5) presentent des trous (23) pour permettre au râtelier d'etre fixé par boulons à un chariot ou à toute autre structure essentiellement rigide.

5. Râtelier sélon la revendication 4, caracterisé en ce que lesdits trous (23) sont disposés sélon deux arcs, ces trous étant utilisés deux par fois pour fixer te râtelier (1) de façon sûre et stable soit horizontalement soit en position inclinée - étant possible d'avoir plusieures positions inclinées sélon tes trous utilisés - chaque position étant définie, stable et réproducible en suite.

Fig. 1

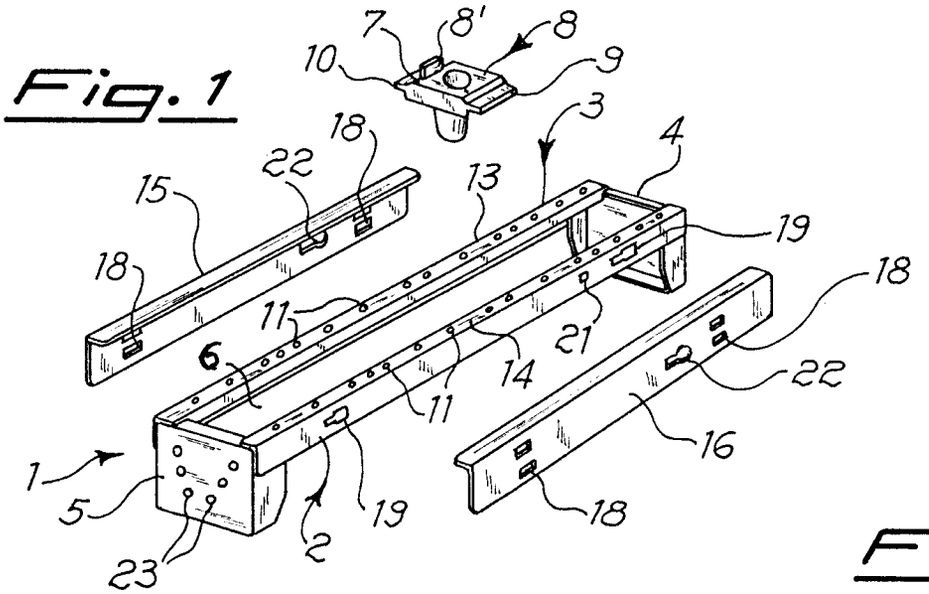


Fig. 2

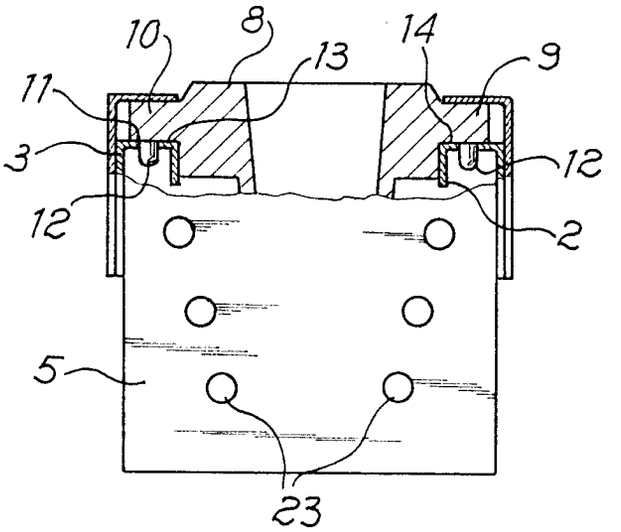


Fig. 3

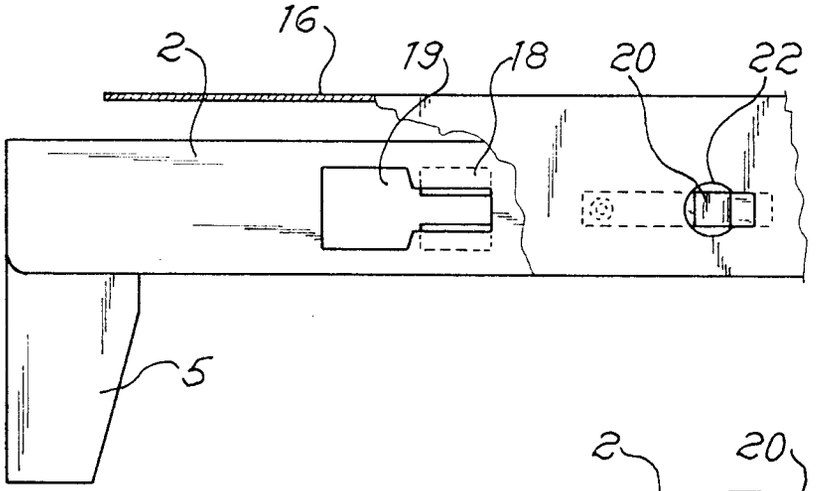


Fig. 4

