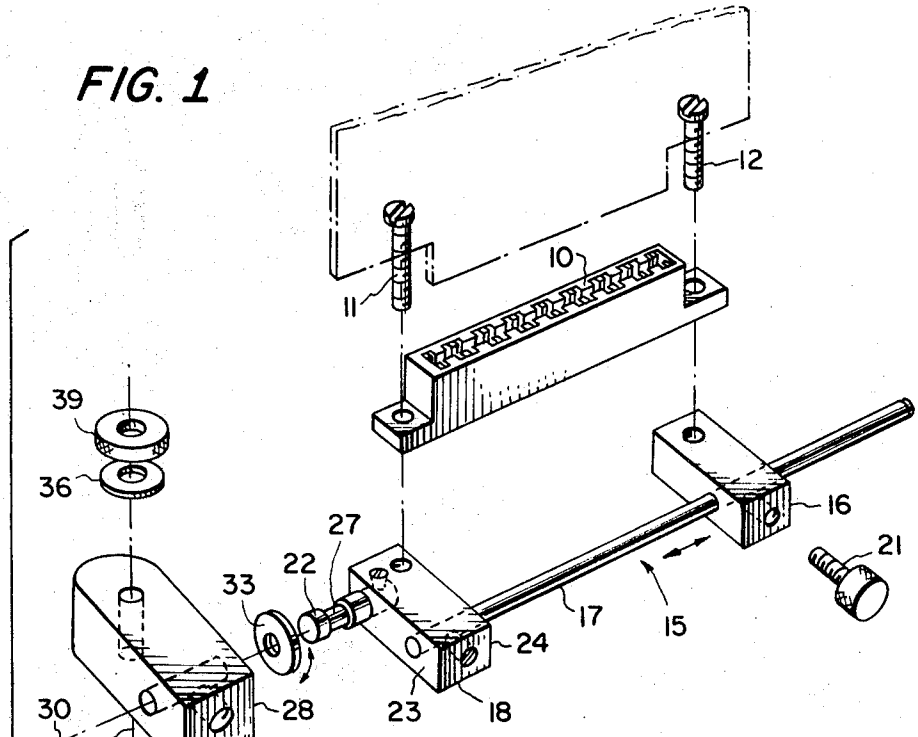
March 2, 1971 M. CHEVILLON 3,567,210

PREFORMED CIRCUIT CARD HOLDER

Filed Oct. 31, 1968

FIG. 1



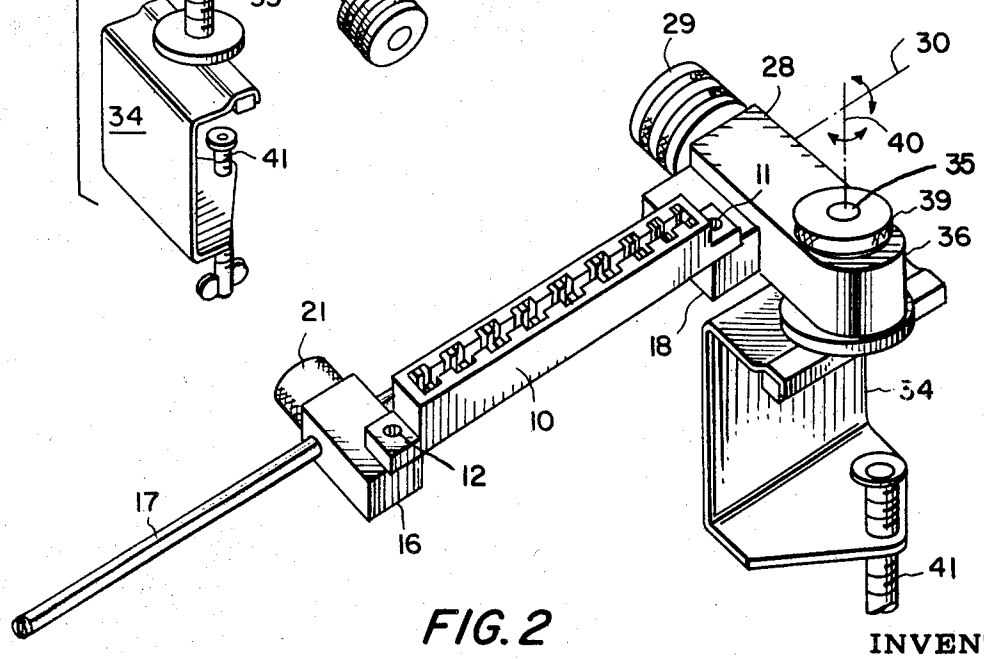


FIG. 2

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PREFORMED CIRCUIT CARD HOLDER

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Int. Cl. B25b 1/22
U.S. Cl. 269—73 5 Claims

ABSTRACT OF THE DISCLOSURE

A work-holding apparatus for holding preformed circuit cards while they are being worked upon. Multidirectional movement of the work-holding portion of the apparatus permits adjustment of the position of the work piece. Adjustable jaws permit preformed circuit card connectors of various sizes to be removably mounted thereon in order to retain preformed circuit cards of various size.

FIELD OF THE INVENTION

The present invention is a work-holding apparatus, more particularly it is a preformed circuit card holder.

PRIOR ART

Prior art work-holding devices require a more elaborate scheme for retaining a preformed circuit card in position than utilized in the present invention. The present invention is a device for retaining the preformed circuit card while it is being worked upon, wherein movement is allowed of the preformed circuit card to be worked upon, into any desired position merely by the adjustment of two screws; furthermore, the mounting of the preformed circuit card connector on the adjustable jaw permits a secure mounting for the preformed circuit card while it is being worked upon.

Prior art devices such as shown in Pat. No. 2,221,108 to Rathbun, issued Nov. 12, 1940, require the work piece to be retained in solely the clamp rather than in its natural environment. In Pat. No. 2,879,059 to Sandefur, issued Mar. 24, 1959, a work piece is retained, by a series of clamps, apart from its natural environment, while it is being worked upon. The device shown in the Sandefur patent permits multidirectional movement of the work piece due to a series of clamps and a caster mounting of the work-holding device. Pat. No. 1,160,103 to Burkhart, issued Nov. 9, 1915, shows a two-directional carpenter's tool clamp where one clamp secures a work-holding piece to a supporting surface and the other clamp retains the work-holding piece in position to be worked upon.

None of the prior art devices, such as those disclosed in the above-described patents, has the feature of retaining the workpiece within its natural environment while it is being worked upon, in combination with a multidirectional movement of the work piece so retained in a relatively small work space, such as the corner of a crowded work bench, merely by the adjustment of two screws. The advantage of retaining the work piece within its natural environment is that there is less possibility of damage to the work piece secured in this manner while it is being worked upon, such as bending or crimping of the preformed circuit piece retained by clamps.

SUMMARY OF THE INVENTION

An object of this invention is to provide a new and improved work-holding apparatus for preformed circuit cards which overcomes the disadvantages of the prior art.

Another object of the present invention is to provide a new and improved work-holding apparatus for preformed circuit cards which permits multidirectional movement of the work piece being worked upon in a small work space.

A still further object of the present invention is to provide a new and improved work-holding apparatus for preformed circuit cards which permits the preformed circuit cards to be worked upon while being retained in their natural environment.

A work-holding apparatus for holding preformed circuit cards to be worked on, embodying certain features of the invention, may include a pluggable, preformed-circuit-card connector having a plurality of sockets for retainably supporting the preformed circuit card to be worked on; a first adjustable clamping means for removably mounting preformed-circuit-card connectors of varying size, the size being dependent on the connector size of the preformed circuit card being worked on; the preformed-circuit-card connector being removably secured to the first adjustable clamping means; and a second clamping means for securing the first adjustable clamping means to a supporting surface, the second clamping means being pivotally mounted on the first adjustable clamping means for pivotal movement of the first adjustable clamping means with respect to the second clamping means, into a desired position for working on the preformed circuit card.

Other objects and many of the intended advantages of this invention will be readily appreciated as the invention becomes better understood by reference to the following description when taken in conjunction with the following drawings wherein:

FIG. 1 is an exploded view of the preferred embodiment of the present invention.

FIG. 2 is a perspective view of the preferred embodiment of the present invention.

DESCRIPTION

Referring now to FIG. 1, a preformed-circuit-card connector **10** is removably secured by means of screws **11** and **12**, on an adjustable jaw clamp **15**. The adjustable jaw clamp **15** has an adjustable jaw **16** mounted on a bar **17**, one end of the bar **17** being secured to the other jaw **18** of the adjustable jaw clamp **15**, the jaw **18** being fixed in relation to the adjustable jaw **16**. The adjustable jaw clamp **15** is adjustable in order to permit preformed-circuit--card connectors of various sizes to be accommodated. The adjustable jaw **16** of the clamp **15** is secured against longitudinal movement along the bar **17** by means of a threaded screw **21**, which may be a thumb screw, as shown in the preferred embodiment. In addition to the threaded screw **21** securing the adjustable jaw **16** against longitudinal movement along the bar **17**, the preformed circuit card connector **10**, being secured to the jaws **16** and **18** of the adjustable clamp **15**, prevents movement of the adjustable jaw **16** in relation to the fixed jaw **18** when so secured. Thus, longitudinal movement of the adjustable jaw **16** is prevented by two means, the threaded screw member **21** and the preformed circuit card connector **10**. This is a dual safety feature of this device in that the adjustable clamp **15** is fixed in position even if the operator forgets to tighten the threaded screw member **21** after adjusting the position of the adjustable jaw **16** along the bar **17** to accommodate a different size preformed circuit card connector **10** than was previously secured to the jaws **16**, **18** of the adjustable clamp **15**.

A second bar **22**, or shaft, is secured to the fixed jaw **18** on the side **23** opposite from the side **24** facing the adjustable jaw **16** of the clamp **15**. The second shaft **22** has a groove **27** therein for permitting rotational movement of the shaft **22** while securing the shaft **22** against longitudinal movement. This will become more readily apparent as the description proceeds.

The grooved shaft **22** is rotatably mounted in a pivot block **28** which serves as the control point for multidirectional movement of the work-holding apparatus. The grooved shaft **22** is retained in the pivot block **28** by means of a second threaded screw **29**. The screw **29** may also be a thumb screw, as shown in the preferred embodiment, and may be adjusted to bear against the grooved shaft **22** at the base of the groove **27** in order to prevent rotational movement of the shaft **22** about the axis **30** of the shaft **22**. The screw **29** may also be adjusted to a position where it does not bear against the groove **27** in the shaft **22**, but is located at a depth less than the depth of the groove **27**. In this manner, the threaded screw **29** permits rotational movement of the shaft **22** while retaining it against longitudinal movement in the pivot block **28**. A washer **33** is mounted on the grooved shaft **22**, between the fixed jaw **18** and the pivot block **28** in a conventional manner to allow relative ease of movement of the fixed jaw **18** in relation to the pivot block **28**, as is conventionally done.

The pivot block **28** is pivotally mounted onto a supporting surface clamp **34**, such as a C-clamp, by means of a threaded shaft **35**. The pivot block **28** is secured to the shaft by means of a washer **36** and a threaded nut **39**. The threaded shaft **35** is mounted in the pivot block **28** in a position normal to the direction of mounting of the grooved shaft **22**. By adjustment of the threaded nut **39** on the threaded shaft **35**, pivotal movement of the pivot block **28**, about the axis **40** of the threaded shaft **35**, and in a direction normal to the plane of the axis of rotation of the grooved shaft **22**, is permitted.

By adjusting the threaded screw **29** and the threaded nut **39**, multidirectional movement of the work-holding apparatus is accomplished. The pivot block **28** is thereby pivotally movable about the axis of the threaded shaft **40** by adjustment of the threaded nut **39**, and the combination of the adjustable clamp **15** and connector **10**, is pivotally movable about the axis **30** of the grooved shaft **22** by adjustment of the threaded screw **29**. Thus, the work piece, a preformed circuit card such as a printed circuit card, which may be retainably secured in the printed circuit card connector **10** shown in the preferred embodiment, and which is the natural environment for the printed circuit card, may be moved into any desired position for relative ease of work upon the printed circuit card.

The supporting surface clamp **34** secures the work-holding apparatus to the supporting surface in a conventional manner by means of a threaded screw **41**. Thus, in a relatively small work space, such as the corner of a crowded work bench, a printed circuit card may be worked upon in the most convenient position, while being retained in its natural environment; i.e., the printed circuit card connector associated with the respective printed circuit card.

It is to be understood that the above described embodiment of the invention is merely illustrative of the principle thereof and that numerous modifications and embodiments of the invention may be derived within the spirit and scope thereof such as replacing the pivot block with a universal ball joint.

What is claimed is:

1. A work holding apparatus for holding preformed circuit cards to be worked on comprising:

a pluggable, preformed circuit card connector having a plurality of sockets for retainably supporting the preformed circuit card to be worked on;

a first adjustable clamping means for removably mounting preformed circuit card connectors of varying size, the size being dependent upon the connector size of the preformed circuit card being worked on, the preformed circuit card connector being removably secured to the first adjustable clamping means, said first adjustable clamping means comprising a first fixed jaw and a first movable jaw slidably mounted in mateable contact with the fixed jaw, the preformed circuit card connector being removably secured to both the first fixed jaw and the first movable jaw, the first adjustable clamping means having the first movable jaw fixed in relation to the fixed jaw when the preformed circuit card connector is so secured, said first adjustable clamping means further comprising a first common shaft secured to the first fixed jaw, the first movable jaw being slantably mounted on the first common shaft for slidable adjustment along the length of the shaft to a desired position dependent on the connector size of the preformed circuit card to be worked on, the first movable jaw being secured in the desired position by a first threaded screw member;

a second clamping means for securing the first adjustable clamping means to a supporting surface, the second clamping means being pivotally mounted on the first adjustable clamping means for pivotal movement of the first adjustable clamping means with respect to the second clamping means, into a desired position for working on the preformed circuit card.

2. A work-holding apparatus for holding preformed circuit cards to be worked on in accordance with claim **1** wherein:

the first fixed jaw includes a first member for mating with the first movable jaw, and a second member pivotally mounted to the first member and the second clamping means, the pivotal mounting comprising a first and a second pivotal mounting; and a second common shaft connecting the first and second members, the second common shaft being secured to the first fixed jaw and rotatably mounted in the second member.

3. A work-holding apparatus for holding preformed circuit cards to be worked on in accordance with claim **2** wherein:

the first pivotal mounting includes a second adjustable threaded screw member removably mounted therein for retarding the rotation of the second common shaft and locking the second member in fixed relation to the first fixed jaw at a desired position, said rotation of the second common shaft pivoting the first adjustable clamp about the axis of the second common shaft, the second common shaft having a grooved portion situated within the second member for receiving the second adjustable threaded screw member so as to permit rotation of the second common shaft while retaining the second common shaft in the second member against longitudinal movement when the second adjustable threaded screw member is adjusted to a position less than the outer diameter of the second common shaft and less than the depth of the grooved portion.

4. A work-holding apparatus for holding preformed circuit cards to be worked on in accordance with claim **3** wherein:

the second clamping means is a second adjustable clamp, having at least one second fixed jaw and a second movable jaw, the second fixed jaw being pivotally mounted on the second member, the second pivotal mounting being a third threaded screw member adapted to be tightened to secure the second member and the second fixed jaw in fixed relation in the desired position, the second member pivoting about the axis of the third threaded screw member when the third threaded screw member is not so secured.

5. A work-holding apparatus for holding preformed circuit cards to be worked on in accordance with claim 4 wherein:

the pluggable preformed circuit card connector is a printed circuit card connector.

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