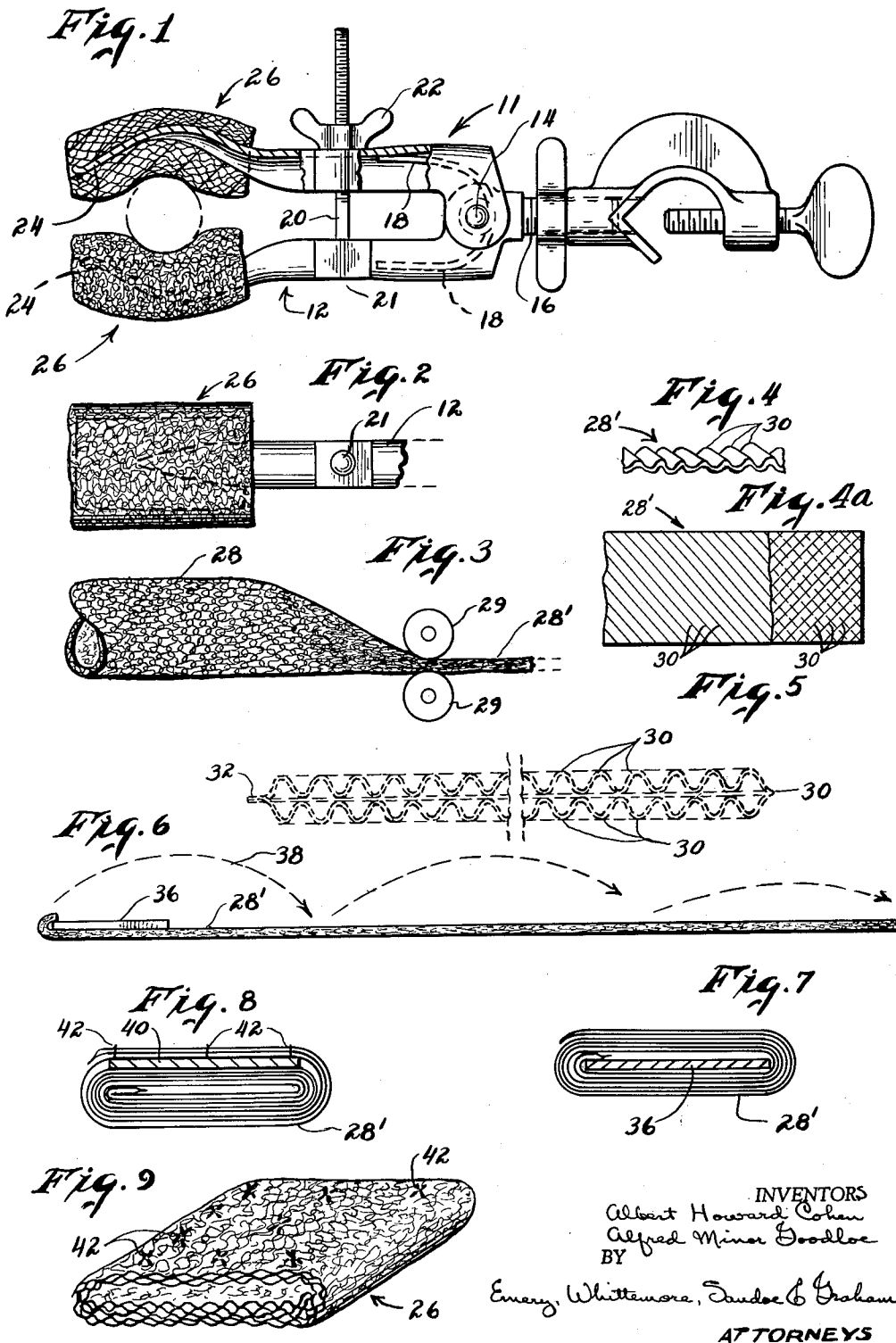


May 8, 1962

A. H. COHEN ET AL
KNITTED MESH CUSHION OR PAD FOR LABORATORY
CLAMPS AND METHOD OF MAKING
Filed June 26, 1959

3,032,849



1

3,032,849

KNITTED MESH CUSHION OR PAD FOR LABORATORY CLAMPS AND METHOD OF MAKING

Albert Howard Cohen, Newark, and Alfred Minor Goodloe, Westfield, N.J., assignors to Metal Textile Corporation, Roselle, N.J., a corporation of Delaware

Filed June 26, 1959, Ser. No. 823,169

12 Claims. (Cl. 24—262)

This invention relates to padding for holding test tubes or other devices in clamps, particularly where the test tube or other device must be heated.

It is conventional practice to provide some sort of padding on clamps which are used to grip test tubes and similar articles which are to be heated over a flame. It has been a serious disadvantage that the padding used for the clamps is damaged by the heat, or becomes hardened so that it no longer serves its intended purpose.

It is an object of this invention to provide an all-metal, resilient, knitted-mesh cushion or pad for laboratory use for clamping test tubes, glassware and other fittings. The pad provides a more uniform pressure against the test tubes, glassware or other items and prevents the breaking of the glassware when clamped tightly enough to support the weight. It also provides enough resilience to permit a certain amount of adjustment, where required, without risk of breaking the glass item.

Prior practice has been to use rubber cushions and asbestos cushions. Molded rubber cushions are limited to a maximum temperature of around 150° C.; and they are affected by the organic solvents commonly used in laboratories. The rubber cushions become brittle with age and become immediately useless when exposed to excessive temperatures. Sometimes the rubber cushions fuse to the apparatus with which they are being used and this requires involved cleaning operations or the discarding of the apparatus.

Asbestos cushions withstand higher heat but have the disadvantage that they lack sufficient resiliency to properly cushion between the metal parts of a clamp and the glass item held in the clamp. The asbestos cushions char when exposed to a flame and they calcine and become powdery. Cotton used to hold the asbestos fibres in place deteriorates with high temperature.

Asbestos cushions have had the additional objection that they are difficult to clean; they require long periods to dry; and because of their capillary nature, often soak up substances which harden in the cushion and destroy the resiliency.

The knitted metal cushion of this invention overcomes the objections encountered with molded rubber and asbestos cushions and it obtains one very important, and unexpected, result in that it holds apparatus securely over a wide range of tightening pressures which allows alignment and adjustment of the pieces of the apparatus without the necessity of changing the clamp screw fitting. In other words, the knitted mesh cushion does not release its pressure suddenly, as is so often observed in other cushions.

One of the advantages of the knitted mesh cushion of this invention is that it retains its resiliency for an indefinite period, in spite of exposure to direct heat. The cushion of this invention can be cleaned easily and immediately replaced in a clamp. Even if encrusted matter

2

is deposited within the knitted mesh, it can be easily broken up and washed out. The cushion can be made of wire constructed of metals or alloys to withstand corrosion and temperature conditions which will be encountered in uses for which the cushion is intended.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views;

FIGURE 1 is a top plan view, partly in section, showing a clamp equipped with a knitted mesh cushion in accordance with this invention;

FIGURE 2 is a fragmentary side view of the clamp shown in FIGURE 1;

FIGURE 3 is a diagrammatic view illustrating one of the steps in the manufacture of the knitted mesh cushion of this invention;

FIGURES 4—8 are diagrammatic views showing other steps in the manufacture of the knitted mesh cushion of this invention; and

FIGURE 9 is a perspective view of the cushion produced by the steps illustrated in FIGURES 3—8 of the drawing.

The clamp shown in FIGURE 1 includes two levers 11 and 12 connected together by a pivot 14. One of the levers has an extension 16 which serves as a bracket for attaching the clamp to a support.

The levers 11 and 12 are preferably of channel cross section throughout a portion of their length, with the channels confronting one another; and there is a spring 18 wrapped around the pivot 14 and bearing against the walls of the levers 11 and 12 to urge the levers away from one another.

A bolt 20 extends through the levers 11 and 12. This bolt has a head 21 which bears against the lever 12; and there is a wing nut 22, threaded on the bolt 20, and in contact with the lever 11. The ends of the levers 11 and 12 remote from the pivot 14 are flattened and curved to form jaws 24 of the clamp. Rotation of the nut 22 in one direction moves the clamp jaws 24 together; and rotation of the nut in the other direction permits the spring 18 to move the jaws 24 away from one another.

There are knitted mesh cushions 26 on each of the clamping jaws 24. These cushions 26 are flattened sleeves into which the jaws 24 fit. The cushions 26 will bend along their length to the necessary contour to fit the curved shape of the jaws 24. Clamp jaws of the type illustrated are curved but are not arcs of a circle throughout their length. The cushion 26 is made to fit snugly on the clamp jaw so that friction assists in holding the cushion in place. However, the knitted mesh of the cushion bends easily enough so that the cushion can be removed from the clamp jaw whenever necessary for cleaning.

In the manufacture of the knitted mesh cushions of this invention, the wire is originally knitted to form a tube 28 (FIGURE 3) which is then flattened by passing between rollers 29, or in any other suitable step for flattening the tube under pressure light enough to leave the knitted mesh loose and resilient.

To add still further to the resilience of the cushion of this invention, the flattened tube of FIGURE 3 is corrugated by giving it a shallow angle crimp to form cor-

rugations 30 (FIGURE 4) extending transversely of the length of the flattened tube.

The size of the wire used to make the knitted mesh tube 28, and the material used for the wire, depend upon the working conditions for which the cushion is intended. Various degrees of resilience can be obtained by different choices in the size of the wire. Larger wires provide less resilience, but may be desirable on larger cushions. The material used should be corrosion-resistant for the working conditions to be encountered. Stainless steel wire is particularly suitable.

For the manufacture of a cushion, a desired length is cut from the tube 28 and this length of knitted mesh is indicated in FIGURE 5, and subsequent figures, by the reference character 28'. This corrugated mesh material is then folded back on itself at 30, as shown in FIGURE 5. With the corrugations at a preferred angle of 45° to the length of the flattened tube, this folding back puts the upper corrugations 30 at right angles to those in the bottom length of the fold and the resulting criss crossing of the corrugations increases the bulk of the folded material.

FIGURE 4a is a top plan view showing the corrugations 30 extending transversely across the mesh 28'. At the right-hand end of FIGURE 4a the material is shown folded back on itself and the criss cross relation of the corrugations of successive layers is clearly shown.

The cut ends of the mesh 28' are preferably spot welded together at the location 32.

The further steps in making the cushion are illustrated in FIGURES 6-8, but because of the scale of the drawing, no attempt is made to show the corrugations or the double thickness obtained by flattening the tube. The flattened tube is considered one layer.

A thin steel strip or form 36 is placed on the knitted mesh 28' near one end and the portion of the mesh beyond the form 36 is bent up over the form as shown in FIGURE 6. The form 36 is then rotated about its right-hand edge in FIGURE 6 to swing the left-hand end of the mesh 28 through an arc indicated by the dotted line 38. This folds a portion of the knitted mesh 28. The form 36 is again rotated about the edge which has now become the right-hand edge and in this manner the knitted mesh 28' is folded successively until the entire length of the mesh has been rolled around the form 36, as indicated in FIGURE 7.

The form 36 is then withdrawn and an electrode strap 40 is inserted into the cushion 26. This electrode strap 40, however, is not inserted in the same location as that occupied by the form 36. In order to have as much resilience as possible at the front of the cushion, the electrode strap 40 is inserted under the third layer of knitted mesh, this being the minimum number of layers that is used for the back of the cushion.

After insertion of the electrode strap 40, the knitted mesh material is secured by spot welds 42. These spot welds attach an end fold of the mesh material (there being two layers in the end fold as a result of the folding back of the flattened tube as shown in FIGURE 5) to the next layer below, that is, the third layer. These spot welds keep the knitted mesh material from unrolling and thus complete the forming of the cushion 26. The electrode strap 40 is preferably copper, to facilitate the spot welding without danger of having the electrode weld to the knitted mesh. The spot welding is preferably a resistance weld.

The electrode strap 40 is removed from the cushion after the spot welding operation, leaving the final cushion as shown in FIGURE 9. The opening left by the removal of the electrode strap 40 provides the opening for insertion of the clamp jaws with which the cushion is to be used.

The preferred embodiment of the invention has been illustrated and described, but changes and modification can be made and some features can be used in different

combinations without departing from the invention as defined in the claims.

What is claimed is:

1. Apparatus for holding a test tube or the like including two clamp jaws having confronting faces that diverge from one another toward mid-regions of the length of the faces, a cushion on each of the clamping jaws, each of the cushions comprising a plurality of layers of wire mesh having stitches knit together and with the layers comprising convolutions of a spiral, each of which convolutions is in contact with a next adjacent convolution, the axis of the spiral extending in the direction of the length of the faces, each of the jaws extending through its associated cushion between two convolutions of the spiral, the convolutions of each cushion being curved both circumferentially and axially along their length to fit the diverging contour of the face of the clamp jaw, and means for holding the jaws and cushions clamped to a test tube or the like.

2. The apparatus described in claim 1 and in which each of the clamping jaws extends between convolutions of the spiral of its cushion rearward of the axis of the spiral whereby most of the resilience of the cushion is in front of the clamp jaw, and the means for holding the jaws is a screw that is adjustable to change gradually the pressure of the cushion against the test tube or the like.

3. The apparatus described in claim 1 and in which the knitted wire mesh material is formed with a corrugated contour having the corrugations extending at an angle to the direction of the length of the axis of the spiral, and the corrugations of successive layers are at complementary angles so that the high part of one corrugation contacts with the surface of the next layer of material at low points of its corrugations to increase the resilience of the cushion and to increase the extent of the cushion outwardly from the face of the clamp jaw.

4. The apparatus described in claim 1 and in which at least two convolutions of the spiral are behind the clamp jaw and there are fastening means holding said two convolutions together to prevent unwinding of the spiral.

5. The apparatus described in claim 3 and in which the corrugations of one layer are at right angles to the corrugations of the next layer.

6. The apparatus described in claim 1 and in which the jaws are curved and the curves change in their radius of curvature along the length of the jaws whereby the cushion cannot come off the end of either jaw without having the cushion bend to a different contour during the movement necessary to remove cushions from the clamp jaw.

7. A slip-over cushion for telescoping over a clamping jaw that holds a test tube or the like, said cushion comprising a flattened roll having layers of wire mesh with loops of the wire knit together, and having certain layers of the roll open at one end of the roll spaced from one another across a clearance that is for receiving a clamping jaw inserted endwise into the roll.

8. The cushion described in claim 7 and in which the cushion is a spirally wound roll of the knitted wire mesh and the layers are formed of flattened tubular material so that certain of the layers have their ends of one piece construction with the ends of the next successive layer of the spiral.

9. The cushion described in claim 7 and in which the clearance for receiving the clamp jaw is offset from the center of the roll so that the cushion has most of its layers and resulting resilience on one side of said clearance.

10. The cushion described in claim 7 and in which the cushion is made up of convolutions that are two layers thick and with the sides of both layers of each convolution of one piece construction.

11. The slip-over cushion described in claim 7, and in

which the layers of knitted wire mesh are corrugated for greater resilience.

12. The slip-over cushion described in claim 11, and in which the corrugations extend transversely of the length of the knitted wire mesh material, and successive layers of the material have corrugations extending crosswise of each other for greater resilience of the cushion.

1,895,156
1,961,339
2,061,046
2,093,268
2,273,033
2,365,268
2,691,201

References Cited in the file of this patent**UNITED STATES PATENTS**

Fisher	Jan. 24, 1933
Crary	June 5, 1934
Schmidt	Nov. 17, 1936
Dyer	Sept. 14, 1937
Goodloe et al.	Feb. 17, 1942
Herter	Dec. 19, 1944
Matthews	Oct. 12, 1954