# Picture Frame Hanging Device

## FIELD OF THE INVENTION

This invention relates to a hanging device for hanging picture frames on walls or other supports, the hanging device being integrally attached to the picture frame in use, the hanging device being particularly suitable for use with picture hanging wire with a textured surface.

## BACKGROUND

Picture frames can be mounted on the wall, or any vertical support, in several ways. A known method of hanging picture frames is by way of utilizing a picture frame hanging wire or hanging wire cables composed of intertwisted individual strands of hanging wire, attached to the back of a picture frame. Each end of the hanging wire is attached by twisting it around a protruding fixture on the frame, such as a nail or eye screw. The protruding fixtures are normally located at opposite sides of the picture frame. The loop of wire thus formed is used to hang the picture frame on an appropriate hook or nail on the desired vertical support.

Prior to twisting the ends of the hanging wire onto the protruding fixtures, the length of the hanging wire is arbitrarily selected. Therefore, if the chosen length of hanging wire is unsatisfactory, it is necessary to untwist at least one end of the hanging wire, readjust the length of the loop of hanging wire and then secure the free end once again by re-twisting. This step of readjusting the length of the hanging wire is time-consuming and often frustrating, especially if readjustment has to be carried out more than once.

There are several types of picture frame hangers known in the prior art that allow for picture orientation and wire length to be adjusted without the inconvenience of untwisting and re-twisting the hanging wire. One such known type is disclosed in US 5,947,438 Lemire, where the adjustment device comprises two or more co-operatively acting adjusters, each of which includes at least one adjustable screw and nut combination. Each adjuster is attached directly onto the picture frame in such a manner that the required number of adjusters for each application are located in mutually co-operative positions e.g. a pair of adjusters are located on opposite sides of a picture frame in mutually opposed positions. The picture wire is connected to each of the screw and nut combinations and the body of the adjuster in such a manner that small sub-loops are created within the main loop. Adjustment of each of the screw and nut changes the size of these sub-loops and thus the length of the main loop. This is said to enable adjustments to the position of the picture, vertically, horizontally or rotationally. USD262,687 Collet discloses another means to allow readjustment of the length of the hanging wire. Instead of passing the hanging wire through eye screws attached to the frame and twisting their ends, a hollow plug with an abutting flange is used. The hanging wire is formed into a loop by passing one end through the eye screw and the hollow plug and then backwards through the eye screw again. In use, the flange abuts the eye screw, clamping the wire between the eye screw and the body of the hollow plug. This arrangement allows the wire to be tightly gripped when inserted through the eye screw, to secure the picture in position.

Another known picture frame hanger is shown in US2004/0035999 Kamenstein et al. This discloses a hanging wire adjustment mechanism which uses at least one rotatable lever acting co-operatively with the hanging wire, close to one end of the wire. Rotation of the lever or levers serves to clamp or release the hanging wire so that it is fixed or movable relative to the adjustment mechanism when adjustment is required.

It is an object of the present invention to provide a picture frame handing device which provides for adjustment of the length of the hanging wire without a user being required to untwist and re-twist the hanging wire, or which will at least provide the public or industry with a useful choice.

## SUMMARY OF THE INVENTION

According to the invention, there is provided a hanging device comprising:

a housing, said housing including attaching means which in use fixedly attaching said hanging device to said picture frame, a passage through said housing to allow said hanging wire to pass through said housing and clamping means to releasably secure said hanging wire in the passage wherein said clamping means is by means of at least one clamping screw through the housing into the passage, each through a threaded bore in said housing.

The clamping screws through said housing into said passage may be substantially perpendicular to said hanging wire in said passage such that the clamping force on the hanging wire is substantially optimum.

The clamping means preferably comprises exactly two screws through said housing into said passage, each through two threaded bores in said housing.

Preferably, the diameter of the passage is proportional to the diameter of the threaded bores and the diameter of the hanging wire used. This will prevent a user from over driving such that the hanging wire is broken by the clamping forces of the clamping screws. Conversely, the user will also be prevented from using a configuration that provides for insufficient clamping forces.

The device also has attaching means which include at least one aperture, preferably two apertures, each for receiving an attachment screw.

The housing of the device may also comprise including two projections, each said projection directly outside said passage, each said projection including a concavely shaped channel. The concavely shaped channel being used as a receptacle for a portion of the hanging wire that is directly outside of the passage.

Preferably, the hanging wire to be utilized is composed of braided individual strands of hanging wire such that the overall surface of the hanging wire is not smooth.

This invention may also be said broadly to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively, and any or all combinations of any two or more of said parts, elements or features, and where specific integers are mentioned herein which have known equivalents in the art to which this invention relates, such known equivalents are deemed to be incorporated herein as if individually set forth.

## BRIEF DESCRIPTION OF DRAWINGS

A picture frame hanging device in accordance with the invention will now be described by way of example with reference to the accompanying drawings in which: -

**Figure 1** shows a back view of a picture frame, with a pair of hanger connectors according to the preferred embodiment attached at each side of the picture frame, and a hanging wire passing between the two

**Figure 2** illustrates the picture frame hanging device of Figure 1 in use at one side of a picture frame

**Figure 3** shows a perspective view of a preferred embodiment of a hanger connector according to the current invention, suitable for use either singly or as one of a pair.

## DETAILED DESCRIPTION OF THE INVENTION

In the preferred embodiment, and with reference to figures 1, 2 and 3, the picture frame hanging device of the current invention comprises a pair of hanger connectors 28 and 28′, acting co-operatively with a hanging wire 34. In use, each of the hanger connectors 28 and 28′ is attached to the back of the picture frame 30 so that when the picture is viewed from the front, no part of the hanging mechanism can be seen. Each of the individual halves of the pair of hanger connectors 28 and 28′ are attached to the picture frame 30 at a position that corresponds to the connection position of the other one of the pair, i.e. so that each one is connected the same distance as the other from the top and the bottom of the frame 30, and from the sides of the frame 30.

Each of the pair of hanger connectors 28 and 28′ is the mirror image of the other. The left one 28 of the pair (as seen looking from behind a picture frame) shall now be described in more detail with reference to figure 3. The corresponding right one 28′ of the pair is formed as a mirror image of the left one 28 described below. All references to front, rear, top, bottom or left and right sides are to be read as if looking forward from behind the picture frame.

The main body of the hanger connector 28 is a rectangular or parallelepiped block 10, with the two largest opposed faces of the block 10 aligned so that in use they face to the front and rear, with the front face flush

with the frame 30. The body of the block 10 is designed such that the two side faces are substantially smaller than the width of the two largest faces (that is, the front-to-rear dimension is substantially smaller than the width dimension), so that when the hanger connector 28 is attached to the picture frame 30, it does not extend a substantial distance rearwards from the frame 30. Projections 18b and 18a extend from the top face 16 of the hanger connector 28 and the bottom face 14 of the hanger connector 28 respectively. The front face part of each of the projections 18b and 18a is also flush with the frame 30. Each of the projections 18a and 18b includes a rearwards-facing concave channel 20a, 20b.

Two connection tabs 24a and 24b also extend from the top and bottom of the main body 10, blending with the projections 18a and 18b. The front faces of these connection tabs 24a and 24b also lie flush with the rear surface of the picture frame 30. Two holes 26a and 26b pass through the connection tabs 24a and 24b respectively. These holes 26a and 26b are designed to allow screws or other suitable securing means to pass through from the rear and attach the housing 10 to the frame 30. They can be countersunk if required. Although two connection tabs 24a, 24b are preferred, in order to provide a secure connection, and avoid rotation of the hanger connector 28 relative to the picture frame 30 under load, a different version of the picture frame hanger connector 28 may be designed with, and thus secured to, the frame 30 with only one connection tab and one corresponding screw hole. This variant is normally used for lighter, smaller pictures, where the weight of the picture is less. It should be noted that if the two-tab variety is being used, the tabs should normally be spaced widely so as to provide a secure connection against rotational forces acting on the hangar connector.

A passage 12 passes through the housing part 10, aligned so that it is substantially vertical in use. The passage 12 connects with, and is aligned with, the channels 20a and 20b.

The overall size of the housing 10 is small in comparison to the picture to be hung, so that it minimises the angular space created between the picture frame 10 and the surface of a vertical support, such as a wall. If required, larger or smaller sizes of housings and hanging wire can be used as appropriate in order to hang pictures of different sizes.

In use the passage 12 receives one end of the hanging wire 34, which has a slightly narrower cross-section than the passage 12. The wire 34 passes along the channel 20b, through the passage 12 and then exits the passage 12 and passes along channel 20a. The narrower cross-section ensures that it can move freely through the passage 12.

It is preferred that the hanging wire 34 to be used with the picture frame hanging device has a textured surface and is not smooth. This can be achieved by, for example, using a braided hanging wire cable, the braids created from a plurality of individual strands of hanging wires.

Figure 3 further illustrates two threaded bores 22 in the housing 10, which are aligned passing through the housing 10 from one side to the other (left to right or right to left), and perpendicular to the passage 12, when viewed from the rear. The bores 22 connect with and pass across the vertical passage 12. Each of the threaded bores 22 receives a clamping screw 38, which pass into the bores 22 from the right when the assembly is viewed from the rear, as shown in Figure 2. In the preferred embodiment, the bores are threaded to receive the clamping screws 38. However, should the bores not be threaded, self-tapping clamping screws 38 may be used instead. In use the hanging wire

34 is inserted in the passage 12 from the top before the clamping screws are tightened, so that the passage 12 is not blocked by the heads of the clamping screws 38, and the hanging wire 34 can pass freely through the passage 12. The clamping screws 38 function as a clamping means to secure the hanging wire 34 within the passage 12. This mechanism is described in greater detail at a later stage.

For similar reasons to those outlined above for using only one connector tab and screw, the hanger connector 28 may have only one threaded bore 22 for the insertion of a single clamping screw 38 for securing the hanging wire 34.

Figure 2 shows the right one 28′ of the picture frame hanger connector pair 28 & 28′ attached by means of a pair of attachment screws 32 to the right side of the back of a picture frame 30. Each of the attachment screws 32 passes through one of the apertures 26a, 26b in the connection tabs 24a, 24b, and into the picture frame 30 in order to fixedly secure the picture frame hanging device 28. Any suitable alternative attachment means, such as nails or tacks instead of attachment screws 32, could alternatively be used. In the case of metal frames rivets or nuts and bolts could also be used.

A portion of a hanging wire 34 is shown with one end 36 inserted into the passage 12 of hanger connector 28′, such that the end 36 of the picture frame hanging wire 34 passes along the channel 20b, then enters the passage 12 at one end 14 of the block 10 and exits the passage 12 at the other end 16 of the block 10, passing along the channel 20a. The channels 20a, 20b acting as a guide for the hanging wire 34. The length of the hanging wire 34 is chosen by a user as an approximately correct length for the picture to be hung, and as seen in Figure 1, the other end of the hanging wire 34 is inserted into the left hand hanger connector 28 in a similar fashion so that a loop of wire is formed between the two. The hanging length (that is, the length of the loop of wire 34

above the housings) can then be adjusted manually. Once the desired length of this loop of hanging wire 34 is achieved, the clamping screws 38 are tightened through the threaded bores 22 in the housing 10, as described above, and as described in more detail below. Once the hanging wire 34 has been inserted into the passage 12, the clamping screws 38 are tightened that their ends grip the textured surface of the wire 34 and force it against the wall of the passage 12. Sufficient pressure is exerted as the screws are tightened so that the weight of the picture and frame 30 will not cause the wire to slip through the passage 12 even with extended periods of use. In particular, tightening the clamping screws 38 onto the wire 34 alters the physical shape of the part of the hanging wire 34 within the passage 12 at the point of contact, resulting in a depression being formed in the hanging wire 34. As a result of this, the clamping screws 38 secure the hanging wire 34 in the passage 12 more securely than devices that hold the hanging wire 34 in position by frictional forces only.

Furthermore, by using the arrangement outlined above, the clamping effect of the clamping screws 38 is strong enough to form the depression or indentation in the hanging wire 34 in such a way that the force required to remove the hanging wire 34 is close to the load rating of the hanging wire. This allows the picture to be hung securely for long periods of time with little or no chance of the wire 34 slipping or releasing from the hanging device, and the picture subsequently dropping from the mounting point. It should be noted that braiding the wire 38 as outlined above helps to create a textured surface that can easily be gripped and deformed by the clamping screws 38.

In one embodiment clamping screws 38 are selected with their length, relative to the width of the housing part 10, being such that when the clamping screws 38 are fully screwed into the threaded bores 22 and their ends are fully extended into the passage 12, they cannot be overdriven so that they would

break the hanging wire 34. The clamping screws 38 may also have round ends so that the chances of damaging the hanging wire 34 is reduced.

With further reference to Figure 1, the full rear view of the picture frame 30, with both of the pair of hanger connectors 28 & 28′ located and attached to opposite sides of the picture frame 30, is shown. As described earlier, the length 40 of the hanging wire 34 can be adjusted to suit. No untwisting and re-twisting of the hanging wire is required – adjustment of the loop length is simply carried out by loosening and tightening the clamping screws 38 on either of the picture frame hanging devices 28. Furthermore, the picture frame 30 can remain on the vertical support while the length 40 of the hanging wire 34 is being adjusted by supporting the picture frame 30 and moving it slightly away from the vertical support.

Since the configuration as shown in Figure 1 enables the readjustment of the hanging wire 34 at either of the hanger connectors 28 & 28′, in some cases it is sufficient to use only one of the pair of hanger connectors 28 or 28′ on the picture frame 30 for readjustment of the hanging wire 34. The end of the hanging wire 34 that is not secured by the hanger connector 28 or 28′ is affixed at the opposite side of the picture frame 30 by using conventional means as described earlier such as twisting the hanging wire 34 through an eye screw.

One important feature of the design of this picture frame hanging device 28 is that low cost manufacturing techniques, such as die-casting, can be used as a mass production method. The hanger connectors 28 & 28′ are preferably manufactured using Zinc Alloy #5 for longer lasting durability as compared to other metals or Zinc alloys. The clamping screws 38 and attachment screws 32 used together with the picture frame hanging device should preferably be Nickel-plated to further enhance the visual appearance of the hanger connectors

28 & 28′. While these materials are preferred, other suitable materials such as brass could be used.

A further advantage is that hanger connectors 28 & 28′ can be manufactured with rounded edges during the die-casting process. The aesthetic value of the hanger connectors 28 & 28′ can be further increased by applying a "Blue Chromate" coating. Not only will the coating provide a quality finish to the product, the "Blue Chromate" coating will also reduce the likelihood of long-term corrosion.

The foregoing description of the preferred embodiment of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed, since many modifications or variations thereof are possible in the light of the above teaching. All such modifications and variations are within the scope of the invention. The embodiments described herein were chosen and described in order best to explain the principles of the invention and its practical application, thereby to enable others skilled in the art to utilise the invention in various embodiments and with various modifications as are suited to the particular use contemplated thereof. It is intended that the scope of the invention be defined by the claims appended hereto, when interpreted in accordance with the full breadth to which they are legally and equitably suited.

## CLAIMS

1. An adjustable device for hanging picture frames, said adjustable device consisting of:

a first hanger connector securely attached in use to said picture frame by an attaching means, said first hanger connector including at least one clamping screw;

a length of hanging wire, said hanging wire releasably secured to said hanger connector at a variable position along said length of hanging wire by said at least one clamping screw;

one part of said hanging wire in use attached by any suitable means to said picture frame, in an opposed position to said first hanger connector, in such a manner that a hanging loop is formed between said hanger connector and said opposed position, said clamping screw interacting with said first hanger connector and said hanging wire such that when said clamping screw is disengaged, the length of said loop can be adjusted by a user, and that when said clamping screw is engaged, said hanging loop has a fixed length.

2. An adjustable device for hanging picture frames as claimed in claim 1 wherein said suitable means is a second hanger connector, said second hanger connector mirroring the construction and location of said first hanger connector such that said first hanger connector and said second hanger connector form an opposed pair in use.

3. An adjustable device for hanging picture frames as claimed in claim 1 or claim 2 wherein said clamping screw interacts with said hanging wire in such a manner that that part of said hanging wire in contact with said clamping screw is temporarily deformed on engagement of said clamping screw, said temporary deformation helping to ensure that said length of said loop is fixed.

4. An adjustable device for hanging picture frames as claimed in any one of claims 1 to 3 wherein said hanger connector includes a first passage, said first passage sized and aligned to allow one end of said hanging wire to pass through freely so that in use part of said hanging wire is accommodated within said passage, said hanger connector further including at least one clamping screw passage into which one end of said clamping screw passes in use, said at least one clamping screw passage intersecting said first passage such that engagement of said clamping screw causes said one end of said clamping screw to contact and temporarily deform said hanging wire.

5. An adjustable device for hanging picture frames as claimed in claim 4 wherein said hanging wire is a braided wire, the braids of said hanging wire interacting with said one end of said clamping screw to aid said temporary deformation.

6. An adjustable device for hanging picture frames as claimed in claim 5 wherein said clamping screw passage and said first passage are sized and aligned such that said temporary deformation of said hanging wire consists of part of said wire being forced from said first passage into said clamping screw passage by said one end of said clamping screw in such a manner that said hanging wire is gripped between said one end of said clamping screw and the intersecting edges of said clamping screw passage and said first passage, said first passage and said second passage being further sized and aligned such that said hanging wire cannot be broken by overdriving said clamping screw.

7. An adjustable device for hanging picture frames as claimed in claim 6 wherein said attaching means for attaching said hanger connector to said picture frame is a pair of tabs extending from the body of said hanger connector, said tabs aligned to lie flush with said picture frame, each of said tabs including a countersunk screw hole, said

tabs aligned so that said screw holes are on opposite sides, or at opposite ends, of said hanger connector.