Dec. 21, 1965 W. A. GRAHAM 3,224,754

FRAMING DEVICE

Filed Sept. 10, 1963

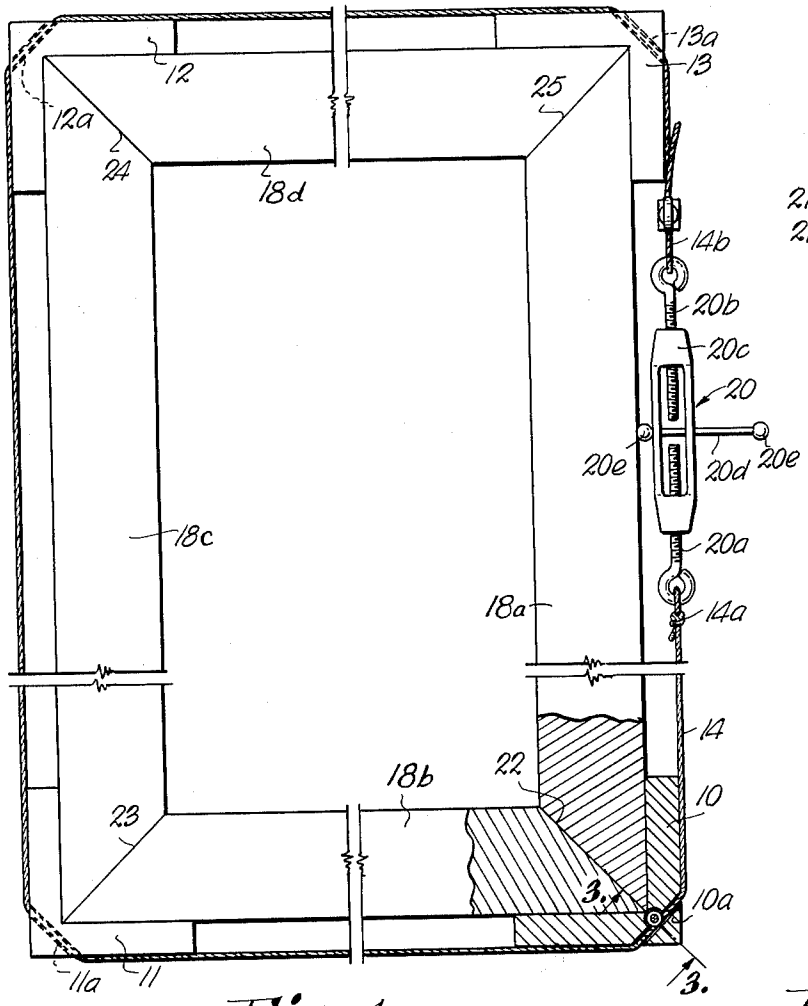


Fig. 1.

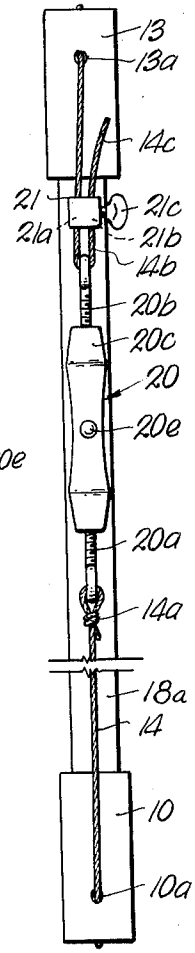


Fig. 2.

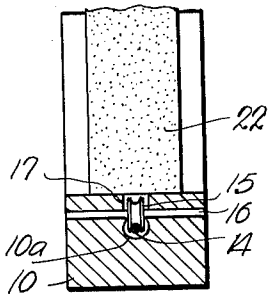


Fig. 3.

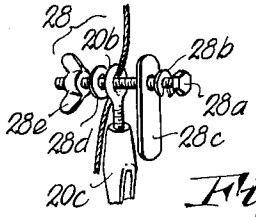


Fig. 4.

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FRAMING DEVICE

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This invention relates to devices for use in carpentry, home and building construction, furniture construction and repair, picture framing, frame construction and repair and the like and refers more particularly to such devices which may be used by a single artisan or individual to align, position and rigidly hold the most varied sort of construction, furniture and picture framing elements to join and connect same.

An object of the invention is to provide a device for aiding in the assembly of picture frames or the assembly of elements of furniture pieces or the like which is much easier to operate, more highly efficient and quicker in terms of results than the known prior art.

Another object of the invention is to provide such a device which does not employ separate rigid members which require their multiple use.

Another object of the invention is to provide such a device wherein all elements thereof are integrated into a single unit which is adequate for a very large multiplicity of size ranges as opposed to the known prior art devices for like purposes.

Another object of the invention is to provide a device which can be utilized to aid in the assembly of triangular, rectangular, pentagonal or polygonal frames or structures of various types.

Another object of the invention is to provide such a device which provides a concentration of compressive forces across the bodies of the various frames or structural members in such manner that virtually guarantees the success of each and every framing or assembly job attempted.

Another object of the invention is to provide such a device wherein, in framing, for example, no nails, screws, corners, dowel pins or the like are needed in assembly of the frame, only glue, as the compression of the frame in assembly is so great that only glue is required.

Another object of the invention is to provide an improved turnbuckle construction which aids in the operation of the instant invention.

Another object of the invention is to provide an improved cable or wire clamping and engaging device which additionally aids in the operation and use of the instant improvement.

Another object of the invention is to provide a framing and assembly device which may be utilized with frame members or structural members to be assembled which have any profile external edge, such profiles accommodated by preparing matching inserts for the corner members of the framing device.

Another object of the invention is to provide a device as described which is of great and extreme simplicity, complete safety in operation, ready accessibility of all parts for repair or cleaning, and easy disassembly and assembly of the entire device for replacement of one or more of its parts. The device is also exceedingly inexpensive and constructed of easily obtained materials.

Another object of the invention is to provide a framing, furniture making, cabinet making, etc. device which is so constructed as to permit the user or operator to tighten the framing assembly with one hand at any desired speed, while using the other hand to finally adjust or align the frame members.

Other and further objects of the invention will appear in the course of the following description thereof.

In the drawings, which form a part of the instant specification and are to be read in conjunction therewith, an embodiment of the instant invention is shown and, in the various views, like numerals are employed to indicate like parts.

FIG. 1 is a front view of a picture frame element assembly with the subject apparatus engaged thereon in joining relationship and action. Portions of the frame and device are cut away to better illustrate the construction and relationship in action thereof.

FIG. 2 is a side view of the apparatus of FIG. 1 from the right in FIG. 1.

FIG. 3 is a view taken along the line 3—3 of FIG. 1 in the direction of the arrows.

FIG. 4 is a perspective vciew of a preferred form of cable clip employed in the framing device assembly.

Referring, then, to the figures, the framing device assembly includes individual right angle corner members **10**, **11**, **12** and **13** (in the particular adaptation shown) joined together in series by a single length **14** of high tensile strength wire, cord, chain, etc. Cable or wire **14** is threaded through openings **10***a*–**13***a*, inclusive, provided through each of the respective corner members. Passages or openings **10***a*–**13***a*, inclusive, are preferably drilled perpendicularly to a line bisecting the interior engaging face angle of the corner member. Each opening or passage is received internally of the respective corner member and is preferably so constructed or lined as to be relatively friction free. Optionally, a sheave or pulley member **15** (FIGS. 1 and 3) rotatably mounted on an axle **16** may be provided in an opening **17** at the inside juncture of the corner member legs whereby to receive cable or wire **14** in rotation thereon for low friction movement of the cable through the passage. The pulley could be externally mounted on the corner but this would be less desirable.

The picture frame members here illustrated extend at right angles to one another and designated **18***a*–**13***d*, inclusive. The ends thereof are mitered at 45° to provide such right angle juncture with one another. Should there be an equiangular triangular frame structure to be joined together, the device corner members would comprise three in number, each having an internal facing angle of 60°. For an hexagonal frame, there would be provided six corner members, each having an internal facing angle of 120°, etc.

One end of cable or wire **14** is connected as at **14***a* to the loop of one screw member **20***a* of a turnbuckle **20**. Turnbuckle **20** has other screw member **20***b*, through the loop of which the other end of the wire threads as at **14***b*, and cage **20***c*. Cage **20***c* has preferably two openings through the sides thereof (not seen) through which extend a shaft **20***d* of a turning handle having enlarged ends **20***e*. Ends **20***e* are enlarged whereby not to pass through said shaft openings. Turning handle **20***d* oscillates back and forth through the openings in cage **20***c* as the turnbuckle is turned each 180° to give a lever action and ease the effort required to tighten down the assembly.

A rough tightening clip generally designated **21** has parallel cable or wire receiving passages **21***a* and **21***b* therethrough, the latter having a set screw **21***c* adapted to compress cable or wire portions passing therethrough. The free end of cable **14** is seen at **14***c*. The total length of cable or wire **14** is variable according to the circumferential length of the frame or furniture assembly which is desired to be enclosed and compressed. There must be sufficient cable length to reach around the assembly, pass through all of the in-place corner members, engage turnbuckle screw portion **20***b* and loop back through

passage **21***b* in clip **20** after initially passing through passage **21***a* thereof.

In use of the device, the frame members **18***a*–**18***d*, inclusive, are first glue-applied at their miter-engaging faces as at **22-25**, inclusive, and then set in level and relatively proper position with all matching faces in contact. This is preferably on some horizontal surface such as a work bench top. The framing device is then fitted around members **18***a*–**18***d*, inclusive, with corner members **10**–**13**, inclusive, engaging each frame corner. At this time, clip **21** is opened by backing off set screw **21***c* and cable **14** is slipped therethrough to provide an ample length of cable to easily and conveniently set the framing corner members **10**–**13**, inclusive, in place. The depth of the corner members (see FIGS. 2 and 3) is shown as greater than the depth of the framing pieces, but this is only preferable, not necessary. It is best if the depth of the framing members is at least equal to the depth of the frame pieces whereby there will not be an excess of force applied to only a portion of the depth of the frame pieces and possible grooving or the like thereof occur under strong compression. If the frame pieces are configured in transverse section at the outer faces thereof, oppositely configured interfitting corner member inserts may be prepared and received within the inner faces of corner members **10**–**13**, the same having smooth outer faces to abut against the corner member inner faces and thus provide uniform application of force to the frame pieces.

Also during the initial fitting process, turnbuckle **20** is so adjusted that cage **20***c* is backed off screw members **20***a* and **20***b* (the opposite of the situation shown in FIG. 1). Once corner members are all in place, the operator grasps the turnbuckle cage **20** with one hand to hold it stable relative to the entire assembly and the free end **14***c* of the cable or wire **14** in the other and pulls the wire tight by sliding it through the loop of screw member **20***b* and the two passages **21***a* and **21***b* in clip **21**. Only a preliminary tautness or tightness is achieved thus and then set screw **21***c* is turned down and cable **14** is locked into relative position by clip **21**. Turnbuckle **20** is then tightened to the desired degree to apply the final precise degree of force desired. The tension in the wire is transmitted by means of corner members **10**–**13**, inclusive, to frame pieces **18***a*–**18***d*, inclusive, and the frame pieces are thereby compressed into the corner members whereby compressive force is applied directly to and into the matching mitered engaging frame member faces in the glued portions thereof. The entire frame assembly process can be accomplished in some 2 to 5 minutes time plus the drying time of the glue used. One turnbuckle **20** is tightened down, no further attention is required to the framing assembly or the frame pieces as there is complete automatic adjustment and a stable structure in force equilibrium. It should also be noted that there is no individual engagement or tightening down required whatsoever at each individual corner member, only an initial positioning in a very unprecise manner with the entire takeup and tensioning operation being accomplished in the rough and fine connection means.

Once the glue has dried, the operator may remove the device by backing off turnbuckle **20** to a lesser tension level and then releasing set screw **21***c*. The entire framing device, as a unit assembly, then may be lifted off the completed frame.

FIG. 4 shows an alternative clip fastener **28** usable both in place of clip or fastener **21** of FIGS. 1 and 2 and the knot used to secure the cable on the other end of the turnbuckle in those views. Fastener **28** comprises a fast locking device which can be hand tightened to a degree that the wire will not slip therethrough. The fastener comprises an elongate bolt **28***a* externally threaded at one end thereof and having an enlarged head at the other end thereof, a lock washer **28***b* adjacent the enlarged bolt head, an elongate oval metal piece **28***c* next thereto, then, on the other side of the turnbuckle screw member **20***b*, a washer **28***d* and a wing nut **28***e*. This is the assembly for the quick tightening end of the turnbuckle. For a more or less permanent connection on the other end of the turnbuckle, if such is desired rather than a knot engagement as seen in the views of FIGS. 1 and 2, the wing nut of the view of FIG. 4 may be replaced by a typical hex-headed nut and the lock washer of FIG. 4 need not be used. This last described assembly permits the relatively permanent affixing of the wire at one end of the turnbuckle by tightening down the hex headed nut (in factory assembly) and leaves the other end of the turnbuckle and the easily loosened wing nut assembly free for sliding engagement of the cable in operation. The elongate oval metal piece **28***c* acts as both an integral part of the eye-bolt clip assembly and as a stay to prevent the turning of the eye-bolt **20***b*. In operation, as the turnbuckle is tightened, the eye-bolt thereof tends to turn with the turnbuckle and twist the wire. This would make the total assembly inoperable and must be prevented. The oval metal pieces **28***c*, one on each eye-bolt, merely rotate around (but less than 180°) and rest against the frame; then all subsequent turns of the turnbuckle cage actually pull things together. This eliminates the possibility of twisting the wire and, accordingly, assures the possible long use of the wire without fraying or breaking. In the tightening of the clip **28** together, the wire is compressed against the two rounded top and bottom surfaces of the eye in the turnbuckle eye-bolt as the wing nut is tightened, forcing the two flat metal pieces against the eye-bolt. The rounded surfaces of the eye-bolt are relatively important because any square corners would tend to cut the wire.

A nominal length of wire for a typical framing device is some 9 feet. This would permit the assembly of all frames with a perimeter of slightly less than 9 feet. Extra wire may be provided to permit the assembly of frames or other multiple part construction of any size, however, since the corner members will be adequate (provided there are the same number of corners having the same angle in two different devices) and are the primary members required for actual assembly. It is also preferable to provide the equivalent of both the rough and the final connection and tensioning means, that is, both the equivalent of clip **21** and turnbuckle **20**. It is not practical to achieve a necessary degree of tension and force application merely through the use of clip **21** alone. It should be understood, however, that, if a means is provided for a rough initial closing of the wire or cable "circle," such as a knot in the wire or cable **14** above turnbuckle screw **20***b*, this may suffice for the then further application of tension through turnbuckle **20**.

The same device can be used in the assembly of other forms and structures. Chairs, boxes, cabinets and the like are representative of such constructions. The instant framing device is useful and applicable in such larger forms in many instances where other presently available devices for the same purposes could not be utilized at all or in a practical manner.

As noted above, the corner members can themselves have any profile of internally facing surface (in transverse section). However, it is more practical to provide smooth internal faces on corner members **10**–**13**, inclusive, and prepare matching inserts, that is, inserts having matching internally facing surfaces to match the outer surfaces of particular frame pieces. Therefore, regardless of external sectional profile of a frame piece, the primary function and goal of the framing assembly is still available and operable, namely, to achieve the concentration of a reasonable compressive force directly into and across the frame piece faces to be joined together.

Another advantage is found in the operative capacity of the assembly which permits the user to tighten the

turnbuckle with one hand at a rate and at times which permit intermediate and final adjustments or alignments of the corner members simultaneously with the other hand. In this regard, the sliding lever arm 20*d* is preferably provided integral with and coacting with the cage 20*c* of the turnbuckle to facilitate and simplify the one-handed tightening operation. It may be seen that the instant assembly makes it far easier and more convenient for one man to handle completely and with relative ease a framing or joining operation of the most varied sort.

Pulley 15 is not required to make the cable motion through the corner members relatively friction free during the tightening operation. In almost any conceivable operation or use, internal smoothing or coating of these passages by low friction substances would provide an acceptable low friction surface. The provision of both the initial and final engaging and tightening down means minimizes these problems as the turnbuckle will drag the wire into proper tightening relationship through even a high friction passage arrangement.

Some modern glues reportedly do not require compressive force to assure permanent bonding. Regardless of the glue type, the instant device may be used in the same manner for perfect alignment of the frame assembly. In this case, the compression of the glued faces would be incidental to the alignment operation but would of course result in the most satisfactorily assembled frame.

The cost and simplicity of this device will permit its use by the most elemental home craftsman and, at the same time, its extreme efficiency will almost dictate its use by the most skilled craftsman.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it will be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A device for aligning and engaging the individual elements of an integral frame in proper assemblage array comprising

a plurality of corner members each adapted to engage with inner portions thereof outer portions of the two frame elements at a corner juncture thereof;

cable means engaging sequentially said corner members via passages therethrough;

means for simultaneously permitting the fixed engagement of said cable at two positions along the length thereof including the corner members therebetween and tensioning the portion of said cable carrying said member;

said latter means comprising a turnbuckle construction incorporating a central cage portion with loop ended screw members threadably engaging opposite ends thereof,

one turnbuckle loop fixedly engaged by said cable length at one of said positions and the other turnbuckle loop fixedly engaged by said cable length at the other of said positions;

and means at one end of said turnbuckle for one of said fixed engagements comprising an elongate bolt externally threaded at one end thereof and having an enlarged head at the other end thereof;

said bolt extending through one of the turnbuckle loops,

an elongate member mounted on said bolt and positioned next to said turnbuckle loop on side thereof;

a washer also mounted on said bolt and positioned next to said turnbuckle loop on the other side thereof;

and nut means threadably engaged on said bolt adapted with the enlarged head of the latter to compact therebetween said elongate member and washer on said bolt toward said turnbuckle loop in such manner as to fixedly seize the cable portion passing through the turnbuckle loop against said loop;

the length of said elongate member sufficient on one side thereof that same will contact the frame in rotation of said turnbuckle screw member thereby preventing twisting of said cable as the turnbuckle is tightened down.

2. A device as in claim 1 wherein the means at each end of said turnbuckle for fixed engagement of the cable therewith are the same.

3. A device as in claim 1 wherein the turnbuckle central cage portion has rod means transfixing same intermediate of the ends thereof through passages formed therethrough in opposition to one another, said rod means slidable to and fro through said passages in alternate extension from opposite sides of said cage when the cage is rotated and enlargements on the end of the rod positioned outwardly of the cage preventing disengagement of the rod from said cage.

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