Jan. 2, 1945. A. W. KEUFFEL ET AL 2,366,449

DRAWING INSTRUMENT

Filed Aug. 14, 1941

FIG. 1.

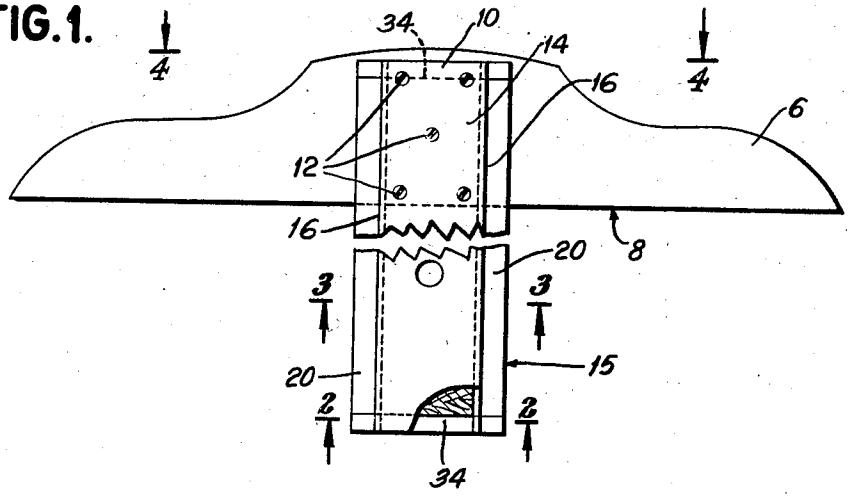


FIG. 2.

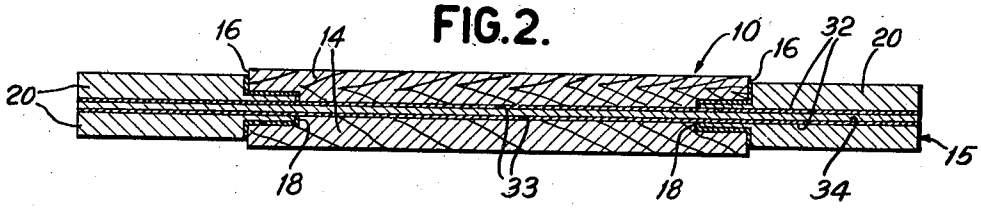


FIG. 3.

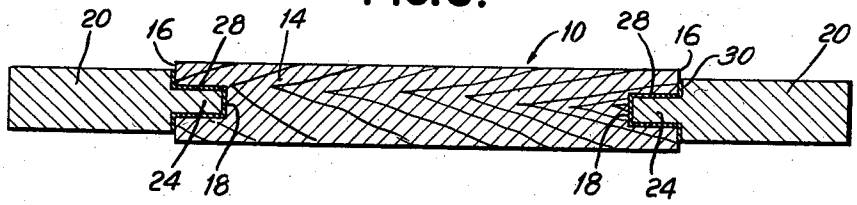
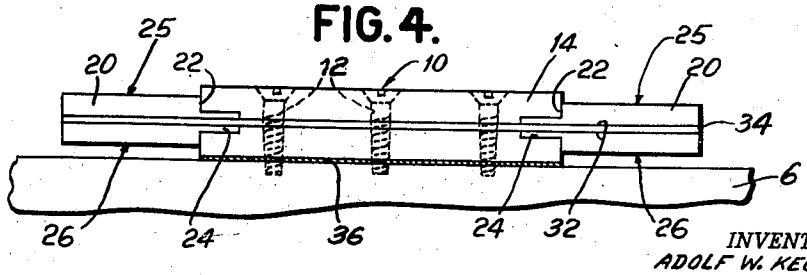


FIG. 4.



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DRAWING INSTRUMENT

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7 Claims. (Cl. 33—112)

This invention relates to straight-edges and more particularly to straight-edges of the type known as T-squares.

Heretofore, straight-edges comprised a blade, usually of wood, and rectangular in cross-section, with straight parallel longer side edges. Sometimes, rectangular strips of transparent material, such as Celluloid, usually of a constant thickness equal to the thickness of the blade, were adhered to the longer side edges with a butt joint and provided the guiding edges along which straight lines were drawn on the drawing surface.

The manufacture of the wooden blades followed accepted woodworking practice and the upper and lower surfaces of the blade were given a sanded finish while the side edges were roughened to be receptive to an adhesive by which the transparent strips were secured to the wood. An adhesive-containing solvent for the Celluloid was applied to the respective parallel longer edges of the wooden blade and to the edge of the Celluloid strip and the strips of Celluloid were held by clamps against the edges of the wooden blade until the adhesive dried. In manufacturing the T-squares in this manner, an excess of the adhesive was always required and this excess worked out from the joint onto the exposed surfaces of the Celluloid strips and onto the exposed surfaces of the wooden blade. After the adhesive had set, the excess adhesive, now dry, was scraped from such surfaces by hand scrapers and sandpaper-like abrasives. This roughened the surface of the Celluloid and made the Celluloid somewhat opaque. In order to restore the transparency of the Celluloid, the blade was customarily repeatedly polished with progressively finer sandpaper, as by running the blades through a three drum sander from fifteen to thirty times. Even with this treatment, it was found impossible to restore the Celluloid to its original transparency. After polishing, it was necessary to apply a finishing coating to the wooden part of the blade which, incidentally, was also applied to the exposed surfaces of the Celluloid strips. After the finish dried, the blade was attached to the head by screws in the conventional manner.

The method described had a number of distinct disadvantages. Adhering the two strips to the wood with a butt joint was time-consuming. The uneven surfaces produced by the adhesive required the later finishing steps which were also time consuming. The attempts to restore the transparency of the Celluloid were never completely successful since it was never possible, in commercial practice, to restore the Celluloid to its original transparency. A solvent adhesive was necessary in order to obtain satisfactory adhesion between the Celluloid and the wood and since this was applied only to one edge of the Celluloid strip, it created strains which tended to warp the blade as a whole. In use, the adhered strips became loose from the wood in the course of time and rendered accurate work impossible. A great deal of labor was required in the finishing operation for sanding and "polishing."

The present invention has for its primary object to facilitate the manufacture of T-squares and other straight-edges with transparent edges.

Another object of the invention is to facilitate the application of the transparent edge strips to the wooden blade.

It is also an object of the invention to secure the transparent strips more firmly to the wooden blade in the interest of durability and accuracy of the T-square.

A further object of the invention is to retain the transparent strips in position against the side edges of the blade and prevent their tendency to separate therefrom.

Yet another object of the invention is to provide transparent edges for a straight-edge, such as a T-square, which are raised above the plane of the lower surface of the wooden blade and hence of the drawing surface so as to avoid wiping ink thereby from a ruling pen onto the drawing surface and causing blots while at the same time firmly securing the edge strips to the wooden blade.

The invention also seeks a straight-edge, such as a T-square, the manufacture of which is practical from the standpoint of convenience and accuracy of manufacture with a minimum number of operations and which, because of the manner of its manufacture requires no finishing operations to remove the damage done the parts in manufacturing operations.

These and other objects of the invention and the means for their attainment will be more apparent from the following detailed description taken in connection with the accompanying drawing illustrating one embodiment by which the invention may be realized, and in which:

Figure 1 is a view, in plan, showing a T-square of this invention, the midportion of which has been broken away in the interest of compactness of illustration;

Figure 2 is a transverse sectional view, taken in the plane indicated by the line 2—2 of Figure 1, looking in the direction of the arrows, and showing details of construction;

Figure 3 is a transverse sectional view taken in the plane indicated by the line 3—3 of Figure 1, looking in the direction of the arrows and showing the construction intermediate the ends of the blade; and

Figure 4 is an end view looking in the direction of the arrows 4—4 of Figure 1.

The T-square, in which this invention is embodied, is illustrated in the drawing as provided with the conventional wooden head 6 having the straight side 8 for engagement with an edge of a drawing board or table, as will be understood. An elongated blade 10, in this instance, rectangular in plan and of generally rectangular cross-section is shown as secured to the head 6 by the five screws 12. The blank for the wooden blade portion 14 is prepared according to any desired or usual woodworking practice and the entire surface of the wooden portion is smoothed as by being given a sanded finish. Thereafter, the entire surface of the wooden blade portion 14 is finished with a suitable coating, for instance, one or more coats of lacquer, which is the final finishing treatment given to the wooden surface or necessary to be given in following the teachings of this invention.

The wooden blanks are provided, in each longer side edge 16 with a longitudinal groove 18 which is preferably rectangular in cross-section and whereof the median line of the groove 18 coincides with the median line of the edge 16.

Transparent edge members 20 are disposed along each side edge 16 of the wooden blade portion 14 to form the straight-edges 15 along which the pen or pencil is guided in drawing a straight line. Preferably, these edge members 20 are formed of Celluloid and are rectangular in plan and in cross-section. Along one longer edge or side 22, each edge member is formed with a longitudinally extending tongue 24, the median line of which preferably coincides with the transverse median plane of the edge member whereby the upper and lower surfaces of the tongue are equally distanced from the respective upper and lower surfaces 25 and 26 of the edge member 20. The shape of the tongue 24 corresponds to the shape of the groove 18 so as to fit therewithin. Conveniently, the tongue and groove are each rectangular in cross-section.

In the preferred embodiment at least the lower surface of the transparent edge member is disposed in a plane spaced from (above) the plane of the lower surface of the wooden blade portions whereby the straight-edges 20, i. e., the Celluloid portions are raised above the drawing surface and cannot be scratched thereby and moreover, the tip of the ruling pen is not in contact with the straight-edge but is below the same so that ink cannot be drawn by capillary attraction between the edge of the straight-edge member and the drawing paper to blot the drawing. In the illustrated embodiment both the upper and lower surfaces 25 and 26 are shown as lying inwardly of the planes of the upper and lower surfaces of the wooden blade portion. The Celluloid edge members 20 may be made by sawing or cutting them from sheets of the desired dimensions and the tongue 24 is then formed as by a frazing operation.

To assemble the edge members 20 and the wooden portion 14, an adhesive 28 is sprayed into the grooves 18 of the wooden portion. The adhesive preferably comprises an alkyd resin dissolved in aromatic coal tar solvents which are not solvents for Celluloid. By reason of the tongue and groove construction, a non-solvent adhesive can be used and forms a firm and durable joint as distinguished from the butt joint of the prior art which made it necessary to use an adhesive solvent to the material of the strip in order to obtain the strongest joint possible, although in use in the course of time such butt joint was found to separate and thus destroy the usefulness of the instrument. Being non-solvent, there is no softening of the edge members by solvent or swelling action. It is preferred to use aged Celluloid as the material of the edge members because it has been shrunk by the aging. Solvent tends to act on aged Celluloid to restore its "life." When "live" Celluloid is attached to wood, it thereafter shrinks and tends to break the joining bond. When the tongues 24 are forced into the grooves 18 some of the adhesive may be forced out of the groove 18 and into the space between the edge 22 of the wooden blade portion 14 and the adjacent edge of the edge member 20, as indicated at 30 to further strengthen the joint. Being non-solvent, any excess which might dry on the surfaces of the blade may be wiped off with aromatic coal tar solvents with no damage to the surfaces.

It has also been found desirable, in the interest of further preventing separation of the edge members from the wooden blade portion, to link or bind the respective edge members against relative separation, particularly at the corners where this is most likely to occur as the result, for instance, of striking the corner against a hard substance. To this end, a strip of material, preferably transparent, such as Celluloid, connects the two edge members together. As such strip overlaps the edge member, it is desirably of the same material as the edge members, such as Celluloid, so that its characteristics are the same and the appearance at the corners does not differ from that of the balance of the edge members intermediate the ends. Accordingly, continuous grooves are formed in the respective ends of the wooden blade portion and the ends of the edge members. The median plane of these transverse grooves preferably coincides with the median plane of the tongues on the edge members 20 but the vertical dimension or width of the grooves 32 is substantially less than the thickness of the tongues 24 on the edge members to prevent weakening the tongues unduly. The end strip 34 may be inserted into the groove after the application of a suitable adhesive but such a procedure usually results in the excess being squeezed onto the finished surfaces, requiring cleaning operations. Since the blade is otherwise substantially complete, we prefer the method hereinafter described.

The end strip 34 is made of a width corresponding to the depth of the groove but is longer than the sum of the widths of the wooden portion 10 and the two edge members 20 so that it will project a fraction of an inch beyond the edge members. After the Celluloid end strip 34, which may have a roughened or "linen" finish, has been fitted into the groove with the ends slightly projecting beyond the edges 15, a drop or two of a solvent for the end strip and the edge members is placed on the projecting part of the end strip. This is drawn between the contacting surfaces of the end strip 34 and edge members 20 by capillary action and cements the two members together. The solvent will restore some of the "life" of the Celluloid edge members but this is not disadvantageous because only a very small

portion near the ends is affected. Thereafter, the projecting portions of the end strips **34** are removed and the blade is complete, although it may be desirable to true up the edges by removing a few thousandths of an inch of the transparent material at the exposed edges.

When the straight-edge member is to be used as the blade of a T-square, one end thereof is then secured to a head **6**. In Figure 4, wherein the adhesive of the blade is not shown, the blade **10** is illustrated as secured to the head by adhesive **36** as well as by the wood screws **12**.

It will thus be seen that a straight-edge, particularly useful in a T-square, has been provided whereof the transparent edges are more firmly secured to the wooden blade portion than has heretofore been possible. By this construction, the process of manufacture is simplified and by reason of the fact that a different adhesive can be used, many of the processing steps heretofore required are avoided.

Various modifications will occur to those skilled in the art in the composition, configuration and disposition of the component elements going to make up the invention as a whole and no limitation is intended by the phraseology of the foregoing description or illustrations in the accompanying drawings, except as indicated in the appended claims.

What is claimed is:

1. Straight-edge means comprising an elongated wooden blade formed with parallel longer side edges formed respectively with longitudinally extending grooves, transparent edge members of rectangular cross-section formed respectively along one side with a tongue to be received in a groove in the blade and adhered therein, at least one end of said blade and the corresponding ends of the edge members being formed with registering grooves, respectively, and a transverse tying strip of transparent material adhered in the grooves in the said corresponding ends.

2. A straight-edge comprising an elongated wooden blade, at least one of the longer side edges of which is formed with a longitudinally extending groove, a transparent edge member formed on one side with a projecting tongue disposed in said groove, said tongue being so disposed with respect to the lower surface of the edge member that said lower surface of the edge member lies inwardly of the plane of the lower surface of the blade and adhesive securing the blade and edge member together.

3. A straight-edge comprising an elongated wooden blade, at least one of the longer side edges of which is formed with a longitudinally extending groove, a transparent Celluloid edge member formed on one side with a tongue disposed in the groove and an adhesive initially non-solvent to Celluloid and comprising an alkyd resin originally dissolved in aromatic coal tar solvent and adhering the proximate surface of the edge member and the blade together.

4. Straightedge means comprising an elongated wooden blade whereof at least one of the longer side edges is formed with a longitudinally extending groove defining plane surfaces on opposite sides thereof, a transparent Celluloid edge member, the thickness of which is less than the thickness of the blade and formed along one edge with a tongue received in the groove and an adhesive non-solvent to the Celluloid of the edge member and adhering the contacting surfaces of the blade and tongue together.

5. Straightedge means comprising an elongated wooden blade whereof at least one of the longer side edges is formed with a longitudinally extending groove defining plane surfaces on opposite sides thereof, a transparent edge member of plastic material, the thickness of which is slightly less than the thickness of the blade and formed along one edge with a projecting tongue received in the groove and an adhesive non-solvent to the material of the edge member and adhering the contacting surfaces of the blade and tongue together.

6. A straightedge comprising an elongated wooden blade formed with parallel longer side edges, at least one transparent edge member along a side edge of the blade, the end of the straightedge and the end of an edge member being formed with registering grooves and a transverse tying strip of transparent material adhered in the grooves.

7. A straightedge comprising an elongated wooden blade of rectangular cross-section at least one of the longer side edges of which is formed with a longitudinally extending groove and a relatively rigid transparent edge member of rectangular cross-section, the vertical thickness of which is slightly less than the vertical thickness of the edge of the blade and formed respectively along one side with a projecting tongue to be received in said groove in the blade and adhered therein, whereby said edge member is upwardly offset with respect to the plane of the bottom surface of the blade.

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