Dec. 5, 1939. C. H. LITTLE ET AL 2,182,028

DRAFTING RULER

Filed Aug. 8, 1936 2 Sheets-Sheet 1

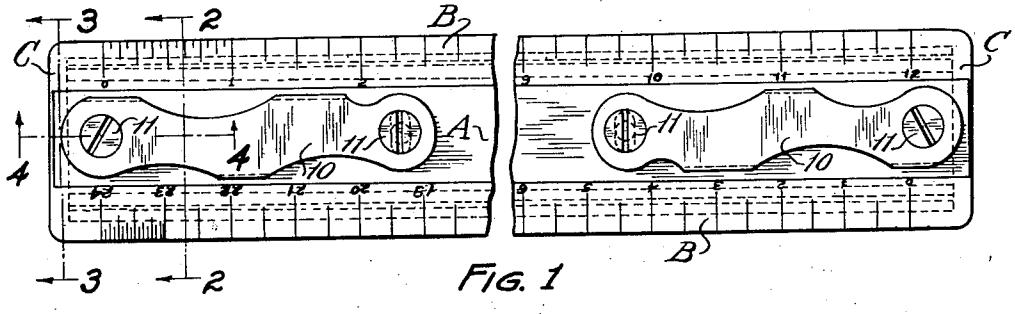


FIG. 1

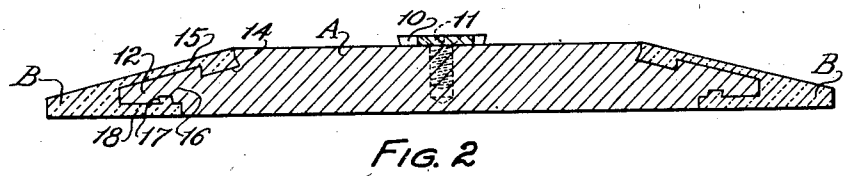


FIG. 2

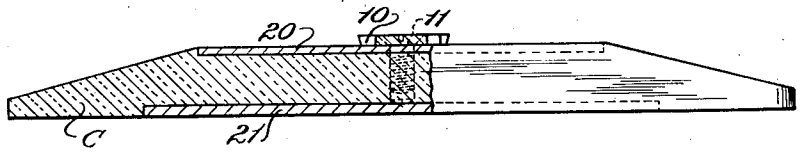


FIG. 3

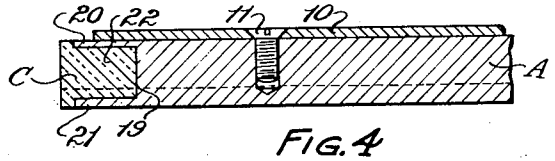


FIG. 4

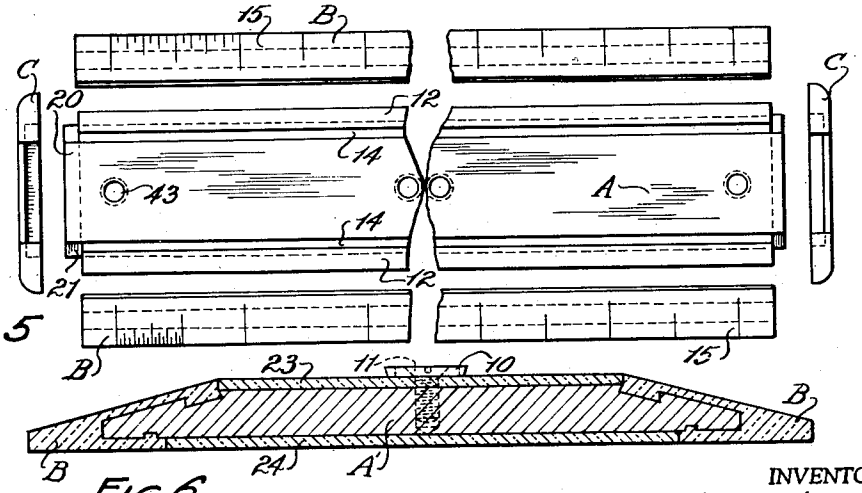


FIG. 5

FIG. 6

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Dec. 5, 1939. C. H. LITTLE ET AL 2,182,028

DRAFTING RULER

Filed Aug. 8, 1936 2 Sheets-Sheet 2

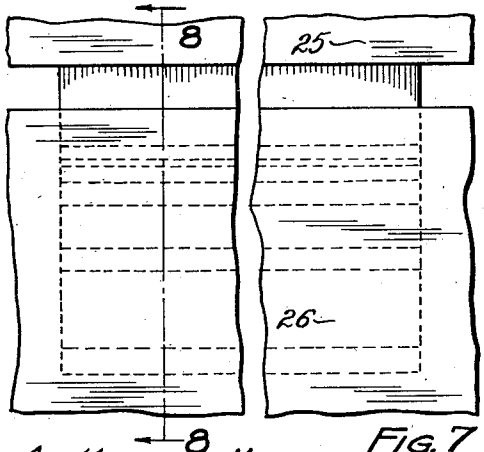


FIG. 7

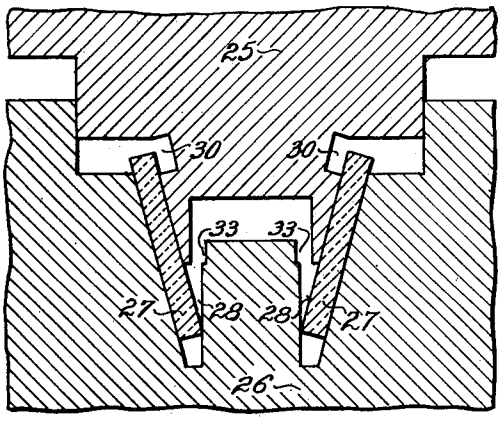


FIG. 8

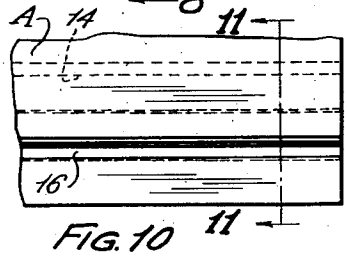


FIG. 10

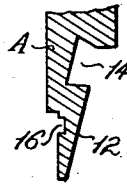


FIG. 11

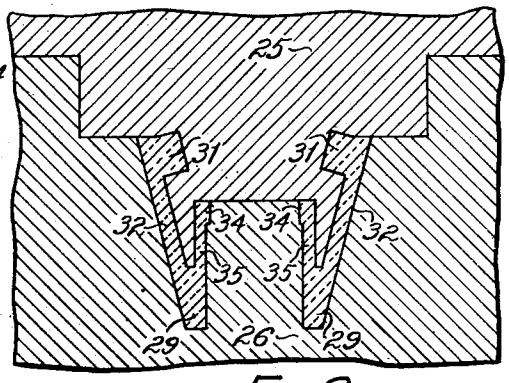


FIG. 9

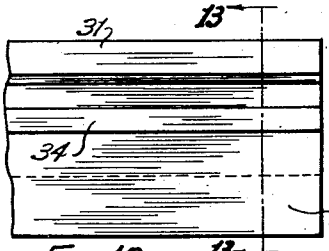


FIG. 12

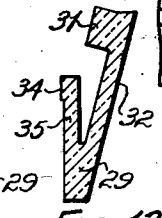


FIG. 13

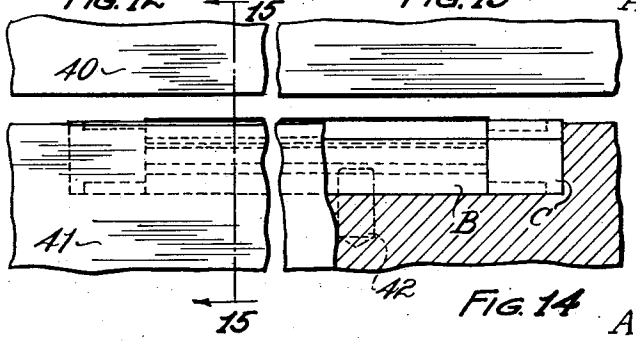


FIG. 14

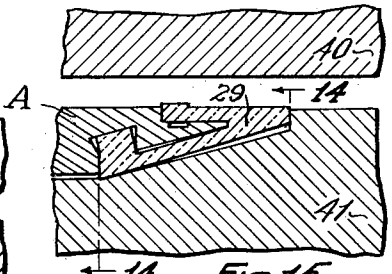


FIG. 15

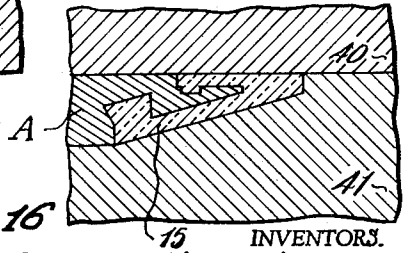


FIG. 16

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UNITED STATES PATENT OFFICE

2,182,028

DRAFTING RULER

Charles Henry Little and Charles Hubbard Little,
Cleveland Heights, Ohio

Application August 8, 1936, Serial No. 95,002

2 Claims. (Cl. 33—107)

The present invention relates to drafting devices or instruments used in drafting, and more particularly to a composite drafting ruler or scale and to a method of making the same.

An object of the present invention is the provision of a novel composite drafting ruler or scale which will be light, stiff, durable and non-warping, and provided with graduations which are readily readable.

Another object of the invention is the provision of a novel composite drafting ruler or scale, comprising a metal or like body provided with an edge strip or strips made of a plastic molded thereon and mechanically interlocked therewith in such a manner as to be firmly and non-removably secured to the body.

Another object of the invention is the provision of a novel method of making a composite drafting ruler or scale, comprising a metal or like body having plastic edge strips mechanically interlocked therewith, wherein the edge strips are preformed to approximately their final shape and subsequently assembled with the previously formed body and molded thereto by heat and pressure.

The present invention resides in certain details of construction, combinations and arrangements of parts and further objects and advantages thereof will be apparent to those skilled in the art to which it relates from the following description of the preferred embodiments thereof, described with reference to the accompanying drawings forming a part of this specification, in which similar reference characters designate corresponding parts throughout the several views, and in which,

Fig. 1 is a plan view of a drafting ruler or scale embodying the present invention.

Fig. 2 is an enlarged section on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged section on the line 3—3 of Fig. 1 with portions in elevation.

Fig. 4 is an enlarged section on the line 4—4 of Fig. 1.

Fig. 5 is an expanded view of the ruler shown in Figs. 1 to 4 inclusive, less the chuck plates.

Fig. 6 is a section similar to Fig. 2, but showing a modified construction.

Fig. 7 is a front elevation of a portion of a pair of molds for preforming the plastic edge strip.

Fig. 8 is a section on the line 8—8 of Fig. 7.

Fig. 9 is a section similar to Fig. 8 but showing the molds closed.

Fig. 10 is an enlarged plan of a portion of the preformed body of the ruler before the edge strips are assembled therewith.

Fig. 11 is a section on the line 11—11 of Fig. 10.

Fig. 12 is an enlarged plan of a portion of the preformed edge strip of the ruler before the same is assembled with the body portion of the ruler.

Fig. 13 is a section on the line 13—13 of Fig. 12.

Fig. 14 is a front elevation, with portions in section on the line 14—14 of Fig. 15, of a portion of a pair of molds for molding the edge strip, etc. to the body portion and to each other, showing the various parts of the ruler in the die cavity and the punch raised.

Fig. 15 is an enlarged section on the line 15—15 of Fig. 14, and

Fig. 16 is a view similar to Fig. 15 but showing the molds closed.

Referring to Figs. 1 to 5 inclusive of the drawings, the drafting ruler or scale shown therein is especially adapted for use with drafting machines such as shown in either of my United States Patents No. 1,909,289 or No. 1,909,291. Generally speaking, the ruler comprises a metal or like stiffening body A and plastic edge strips B, preferably made of a polymerization product of a vinyl compound, molded thereto and mechanically interlocked therewith. In the preferred embodiment shown the ends of the ruler are also provided with end strips C of the plastic, in such a manner that the edges of the ruler are formed entirely of the plastic. The side edges of the ruler are beveled, as clearly shown in Figs. 2 and 3, and provided with graduations, etc., preferably molded therein. Opposite ends of the ruler are provided with chuck plates 10, adjustably secured to the body portion A as by screws 11. The two chuck plates permit the ruler to be reversed, that is, either end of the ruler may be chucked to the chuck arm of the drafting machine, as is the usual custom. The chucks and chuck arm, as well as the body portion A of the ruler, are preferably made of Duralumin and given an oxide coating by an electrolytic process known in the art which produces a surface that is free from glare, has a pleasing appearance, and will not rub off and soil the drawing paper or surface upon which the ruler is used.

We have discovered that the polymerization products of vinyl compounds, such as vinyl chloride, vinyl acetate or vinyl benzine have characteristics which adapt them peculiarly to the present use. Plastics made of these products are light in weight, tough, and flexible without being brittle, feel well to the touch, and can be tinted var-

ious colors. Edge strips made therefrom do not shrink or warp, are light in weight, durable, easy to clean, etc. The vinyl acetate is permanently nearly white and can be readily made transparent, in which event the graduations may be placed on the underside of the edge strip. Commercially known plastics sold under the trade names "Vinolyte", "Vietro", "Galva", etc., are suitable for the present purpose. These products are polymerization products of vinyl compounds, can be molded at relatively low temperatures and pressures, and have a very low and constant mold shrinkage, which latter characteristic makes it possible to mold graduations on the edge strips very accurately. Graduations may also be readily cut therein, but it is usually less expensive to mold the same.

The side edges 12 of the body A are top beveled to conform somewhat to the shape of the finished ruler and both sides are undercut or reduced in thickness so that the plastic edge strips, which in the present instance form the entire beveled surface of the ruler, will come flush with the surface of the body between the edge strips. The upper surface of each of the side edges is provided with a dove-tailed or undercut groove 14 into which portions of the plastic flows during molding to securely lock the upper prongs 15 of the V-shaped edge strips to the upper side of the top bevel of the body A. The lower undercut edges of the body A are also provided with grooves 16, the outer sides 17 of which, at least, are undercut and into which the plastic flows during the molding operation to securely lock the lower prongs 18 of the edge strips to the body.

As shown, both ends of the body portion A are grooved as at 19 to provide upper and lower flanges 20 and 21, respectively, and the plastic which extends across the ends of the ruler projects as at 22, see Fig. 4, into the groove 19 formed between said flanges. This construction produces a very strong connection between the various parts. If desired, the upper and lower exposed metal surfaces of the body A may likewise be covered with the plastic. In this event the metal body portion is preferably made of reduced thickness inside of the edge strips and the metal removed replaced by plastic material bonded to both the body and the edge strips. Such a construction is illustrated in Fig. 6, wherein the body A' is similar to the body A previously referred to, except for the fact that a small amount of metal has been removed from both the upper and lower surfaces thereof between the edge strips B and replaced by the plastic as at 23 and 24, respectively.

In order to get an even distribution of the plastic along the edges of the ruler and thereby avoid the possibility of setting up undesirable and detrimental strains in the edge strips, the edge strips B are preferably preformed to approximately their final shape and subsequently assembled with the body portion preparatory to the final molding operation. While the end strips C may be formed in any desired manner, preferably, they are also preformed to substantially their finished shape and bonded with the body A and the edge strips B during the final molding operation. In the modification shown in Fig. 6 the plastic parts 23 and 24 are preferably preformed, or consist of sheet material bonded to the edge strips and the body in the final molding operation.

The commercially known products previously referred to are readily obtainable in sheet form, in which form they are very dense, hard, and tough. These desirable characteristics are in part lost in the event the material is greatly disturbed in subsequent molding operations, and the method of the present invention contemplates the formation of edge strips from this sheet material with the minimum disturbance or re-distribution of the material, especially that part of the material which in subsequent use is subject to the greatest wear. The preferred manner of carrying out the method of the present invention is shown in Figs. 7 to 16 inclusive. As previously stated the method of this invention consists in preforming the body portion A to substantially their final finished shape, and the edge strips B to approximately their final finished shape, assembling the various parts together, and bonding the same together under heat and pressure. The edge strips B are preferably preformed to the shape shown in Figs. 12 and 13 by cooperating molds consisting of a punch 25 and a die 26, from commercial material in sheet form of desired thickness cut to appropriate length, with a minimum disturbance or redistribution of the sheet material especially that part of the material which ultimately forms the ruling edge and the top and bottom surfaces of the edge strip. The sheet material 27 is placed in the die cavities 28 in the manner shown in Fig. 8, and upon the initial lowering of the punch 25 the lower edges of the sheets 27 are forced down into the bottom of the cavities with substantially no disturbance or re-distribution of that part of the material which forms the ruling edge of the edge strips. Upon continued movement of the punch the upper parts of the sheets 27 fill the upper cavities of the die and punch, and undergo considerable change, but this is not materially detrimental to the finished product, since these parts of the edge strip are not subject to the same wear, etc., as the ruling edges.

The cross section of the finished edge strip blanks 27 as shown in Fig. 13 is V-shaped, with the right hand prong extended. Recesses 30 in the punch 25 form rectangular projections 31 on the inside of the upper ends of the extended legs 32, and smaller apertures 33 in the die 26 form small projections 34 on the corresponding sides of the other legs 35 of the blanks. The blanks 29 are removed from the punch by placing a tool under the upper outside edge thereof and bending the extended prong outwardly. When the edge strip blanks 29 are assembled with the body A, the projections 31 extend into the grooves 14 and the projections 34 come opposite the grooves 16. The projections 31 are higher than the grooves 14 are deep so as to provide the necessary material for filling the dovetails. The material for filling the grooves 16 comes from the projections 34.

The final molding operation is performed in the molds shown in Figs. 14, 15 and 16, comprising a punch 40 which cooperates with the die 41 to form the cavity. The manner in which the preformed parts of the ruler are assembled in the die 41 is clearly shown in Figs. 14 and 15. The closed position of the molds is shown in Fig. 16. The body portion A is held from moving lengthwise by a pin 42 extending into the mold cavity and projecting into one of the apertures 43 in the body subsequently used in attaching the chuck plates 10. Both molding operations herein referred to take place under heat and pressure, and it is to be understood that ade-

quate means (not shown) is provided for heating the molds and forcing the same together.

From the foregoing description of the preferred embodiment of the invention and the preferred method of forming the same, it will be apparent that the objects heretofore enumerated have been accomplished. While the preferred embodiment and the preferred method of making the same have been herein described in considerable detail, we do not wish to be limited to the construction or steps shown, which may be varied within the scope of this invention and we particularly point out and claim as our invention the following:

1. A composite drafting ruler comprising a metal ruler body made of an aluminum alloy and extending from the upper side of the ruler proper to the lower side thereof, the perimeter of the lower side of said ruler proper being formed of plastic molded in position and mechanically interlocked with the ruler body, and an electrolytically produced oxide coating on the exposed portions of said metal ruler body.

2. A composite drafting ruler comprising a metal ruler body made of an aluminum alloy and extending from the upper side of the ruler proper to the lower side thereof, said ruler body having outwardly tapering top bevel edge portions, V-shaped edge strips engaging around said bevel edge portions of said ruler body, end strips connected to the ends of said edge strips and extending across the ends of said ruler body, said edge strips and said end strips being formed of a plastic molded in position, said bevel edge portions and said edge strips having interfitting tongues and grooves for mechanically interlocking said edge strips to said edge portions, and an electrolytically produced oxide coating on the exposed portions of said metal ruler body.

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