Feb. 5, 1952 R. E. HOPP 2,584,451

LATCH AND PIVOT FOR FOLDING RULES

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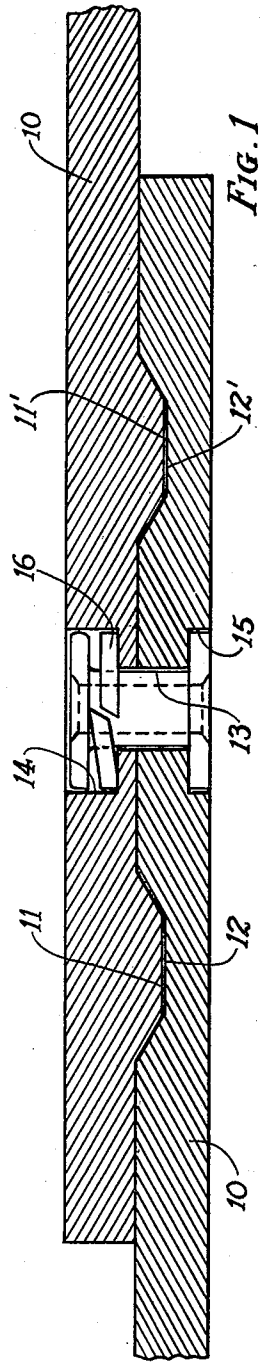


FIG. 1

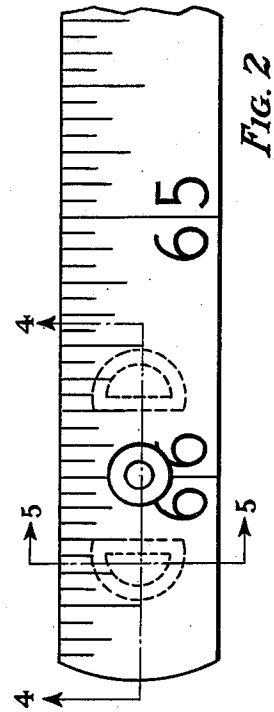


FIG. 2

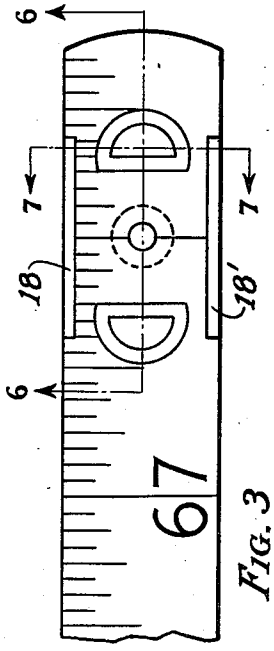


FIG. 3

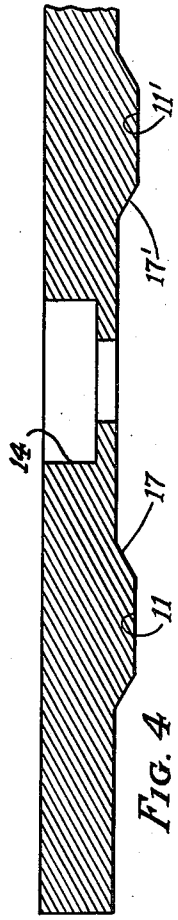


FIG. 4

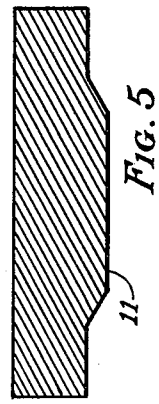


FIG. 5

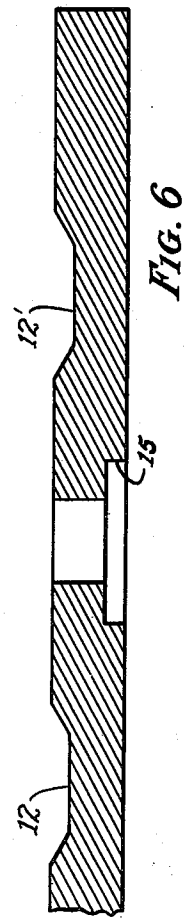


FIG. 6

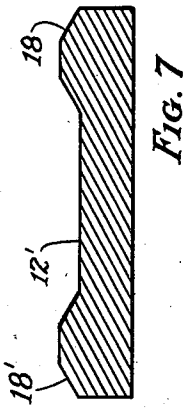


FIG. 7

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LATCH AND PIVOT FOR FOLDING RULES

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This invention relates to folding rules of the type made from a plurality of short sections in the form of thin strips of a solid material, the adjacent end portions of which are overlapped and the strips themselves joined together by a pivoting fastener through the overlapped ends. Rules of this type may be, when the sections thereof are folded together, conveniently carried in the pocket.

In particular, this invention relates to a combination latching and pivoting structure for joining sections of a folding rule and has for its main object to provide an improved arrangement of cooperating parts whereby the rule sections may be temporarily secured in an open, closed, or right angular position relative to each other without deformation of any part of the body of the rule sections.

Another object of this invention is to provide an improved latch and pivot construction particularly adaptable to folding rules having the sections thereof made from a molded or pressed plastic material of high tensile, compressive, and flexural strength and having, in addition, a high toughness and hardness characteristic. One well known example of such a plastic material is "Bakelite."

A further object of this invention is to provide a folding rule which is inexpensive, durable, and simple of manufacture.

The latch and pivot arrangement for a folding rule in accordance with this invention comprises interfitting raised and depressed surfaces on the overlapping adjacent faces respectively of the rule sections and a hinge pin passing therethrough. The sections are pivoted about and held together by the hinge pin which may conveniently be made in the form of an upset hollow rivet. The interfitting raised and depressed surfaces are arranged equidistant from the center of the hinge pin along the central longitudinal axis of the sections and give a latching effect in any one of three positions whereby the rule sections may be temporarily secured in an open, closed, or right angular arrangement relative to each other. Surrounding the hinge pin and held in partial compression between one face of the overlapped sections and one end of the hinge pin is a tension device, by means of which the cooperating latching surfaces are held in intimate contact.

I am aware that folding rules of the type described in U. S. Patent No. 496,123 to Keuffel and No. 1,538,995 to Lakatos are well known. In rules of this type, the material from which the body of the rule sections is formed is sufficiently flexible to permit the cooperating latching devices to pass into and out of engagement without damaging the same or a section end cover is provided of a material which will flex without damage. Other types of rules, such as that described in U. S. Patent No. 1,690,071 to Hoerle, have section end covers which include tension means whereby the latching devices pass into and out of engagement without flexing the main body of the rule section.

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In a rule according to this invention, the latching devices are formed in, and of the same hard material as, the body of the rule section and a single tension means is provided which, in cooperation with the hinge pin, permits the latching devices on each section to pass into and out of engagement without flexing or deforming the body portion of the rule sections.

In the accompanying drawing, wherein only two rule sections are shown for illustrative purposes and not by way of limitation, a preferred embodiment of the invention is disclosed. It is to be understood that as many sections as desired may be used, one section being joined to the next as described hereinafter.

Figure 1 is a central longitudinal view through a folding rule with a joint and latch structure according to this invention;

Figures 2 and 3 are plan views on a somewhat reduced scale of the upper and lower rule sections respectively shown in Figure 1;

Figures 4 and 5 are sectional views taken on lines 4—4 and 5—5 of Figure 2; and

Figures 6 and 7 are sectional views taken on lines 6—6 and 7—7 of Figure 3.

Referring to the drawing in detail, the rule sections 10 are formed by pressing or moulding from a plastic material having a high tensile, compressive, and flexural strength in addition to a high toughness and hardness characteristic. One material which has been found to be very satisfactory for this purpose is commonly known as "Bakelite." The rule section members 10 are formed with cooperating raised and depressed latching surfaces 11, 11' and 12, and 12' respectively on adjacent faces at their overlapping ends. Midway of the cooperating latching surfaces, a hinge pin 13 is provided, preferably in the form of a tubular rivet, to connect the overlapping end sections. Recesses 14 and 15, formed in the outside faces of the overlapping ends of the sections 10 as shown, are adapted to receive the upset ends of the hinge pin and, in this way, a flat smooth overall surface on the rule is provided. A tension device 16, shown in the form of a lock

washer surrounding the hinge pin, is secured in the final assembly between the outer face of one of the overlapped section ends and one end of the hinge pin.

The side walls of the latching surfaces are formed as sloping sides whereby the rule sections may be easily moved relative to each other from one latched position to another against the compressive force of the tension device. It is to be noted that the cooperating latching surfaces 11, 11', 12 and 12' are arranged symmetrically and equidistant from the center of hinge pin 16 along the central longitudinal axis of the rule section members 10. Thus the members will be held against relative turning movement whether the same be in an extended (open) or folded (closed) position.

The sloping sides 17, 17' (Fig. 4) of the raised latching surfaces 11 and 11' (Fig. 1) are spaced apart a distance substantially equal to the width of the rule sections 10. In the embodiment shown in the drawing, the raised latching surfaces are formed on the underside of each upper rule section 10. At each pivoted joint, additional sloping sides 18, 18' are provided along each of the upper longitudinal edges of the adjacent face of each lower rule section member 10 within the longitudinal limits of the overlapped end portions of the members (Figs. 3 and 7). By means of these cooperating sloping sides, the section members 10 of the rule may be temporarily secured in a right angular relation.

The operation of the latching and pivoting structure of this invention will be described by reference first to Figure 1 wherein the rule section members 10 are shown in an extended (open) position and raised surfaces 11 and 11' of the upper rule section 10 are received within the recessed surfaces 12 and 12' of the lower rule section 10. The sections are held in this interfitting relation by the partial compression of the tension device 16. A movement of either section 10 relative to the other will result in sliding the sloping sides against each other and further compression of the tension device 16. If, for example, the movement of the upper rule section 10 relative to the lower section 10 is continued in a clockwise direction, the raised surfaces 11 and 11' of the upper section 10 will ride up to and pass over the smooth portions of the adjacent face of the lower section 10. When the relative movement of the rule sections approaches 90°, sloping sides 17 and 17' of the raised surfaces 11 and 11' respectively (Fig. 4) will reach and begin to ride down the sloping sides 18 and 18' (Figs. 3 and 7) formed along the outside edge of the adjacent face of the lower rule section 10. Thus, when the rule sections have been moved to the 90° relation, these last mentioned sloping sides will interfit and the rule section members will be temporarily secured under the partially released compressive force of tension device 16. Further movement of the rule sections in the same direction relative to each other will disengage the sloping sides 17, 17' of raised surfaces 11 and 11' on the upper section member from the sloping outside edges 18, 18' of the lower section, and upon completion of the second 90 degrees of rotation, the sections will interlock in the folded (closed) position, in which the cooperating raised and lower surfaces 11', 12 and 11, 12', respectively, interfit and temporarily secure the rule sections under the compressive force of the tension device 16.

From the above description of the invention, it will be seen that the latching and pivoting arrangement will provide a temporary securing means for the rule section members whereby the same may be held in any one of the three predetermined positions relative to each other, and that the section members can be moved into and out of these positions without deformation of any part of the body of the sections. In view of this latter characteristic of the invention, it will be seen that the latching and pivoting arrangement is particularly adaptable to rules having the section members thereof molded or pressed from "Bakelite" or a like non-deformable plastic material.

It will also be seen that the simplicity of the manner in which the section members can be assembled will materially aid in reducing the cost of manufacturing rules of this type.

I claim:

1. A latch and pivot structure of the class described comprising a pair of rigid flat section members having overlapping end portions, a hinge pin having upset ends arranged through the overlapped portions of the members whereby the said members are pivotally connected, a pair of rigid raised symmetrical surfaces having sloping sides extending from each surface to the body formed on one of the members on one face thereof, a pair of depressed surfaces having sloping sides formed in the body of and on the adjacent face of the other of the said members, said sloping sided depressed surfaces having a configuration complementary to and interfitting with the said sloping sided raised surfaces, the units of the said complementary pairs of raised and depressed surfaces being spaced equidistant from the hinge pin on opposite sides thereof and along the central longitudinal axis of each of the members, and a tension means interposed between one upset end of the said hinge pin and the adjacent face of one of the said members.

2. A latch and pivot structure according to claim 1 in which the sides of the members adjacent the upset ends of the hinge pin are recessed at the point of passage of the hinge pin therethrough, the said upset ends being arranged in said recesses, and in which the tension means is also arranged in one of the said recesses.

3. A latch and pivot structure according to claim 1 in which the distance between the adjacent sloping sides of the pair of raised surfaces is substantially equal to the width of the section members.

4. A latch and pivot structure according to claim 1 including also sloping sides, complementary to and adapted to interfit with the adjacent sloping sides of the pair of raised surfaces formed on one of the members, arranged along the outside edges of the adjacent face of the other of the members and within the longitudinal limits of the overlapped end portion of the said other member.

5. A latching structure, adapted for use with a pivot joint, said joint including a pair of substantially flat section members having overlapped end portions, the body of said members being of a non-deformable material, and an upset hinge pin arranged through the overlapped portions whereby the members are pivotally connected, comprising a pair of non-deformable symmetrical raised surfaces formed on one of the adjacent faces of the members within the longitudinal limits of the overlapped end portions thereof, a pair of non-deformable depressed surfaces formed on the other of the adjacent faces of the members having a configuration complementary to and interfitting with the said

raised surfaces, the units of the pairs of said raised and depressed surfaces being spaced equidistant on opposite sides of the hinge pin and along the central longitudinal axis of the members, and a deformable tension means interposed between one end of the upset hinge pin and the body of one of the members.

6. A latching structure according to claim 5 in which the said raised and depressed surfaces have sloping sides extending therebetween and the said faces of the members.

7. A latching structure according to claim 5 in which the sides of the members adjacent the upset ends of the hinge pin are recessed at the point of passage of the hinge pin therethrough, the said upset ends being arranged in said recesses, and in which the tension means is also arranged in one of the said recesses.

8. A latching structure according to claim 5 in which the distance between the adjacent sloping sides of the pair of raised surfaces is substantially equal to the width of the section members.

9. A latching structure according to claim 5 including also sloping sides, complementary to and adapted to interfit with the adjacent sloping sides of the pair of raised surfaces formed on one of the members, arranged along the outside edges of the adjacent face of the other of the members and within the longitudinal limits of the overlapped end portion of the said other member.

ROBERT EWING HOPP.

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