May 9, 1933. A. L. STOWELL 1,907,459

FOLDING RULE

Filed Dec. 4, 1931

Fig. 1.

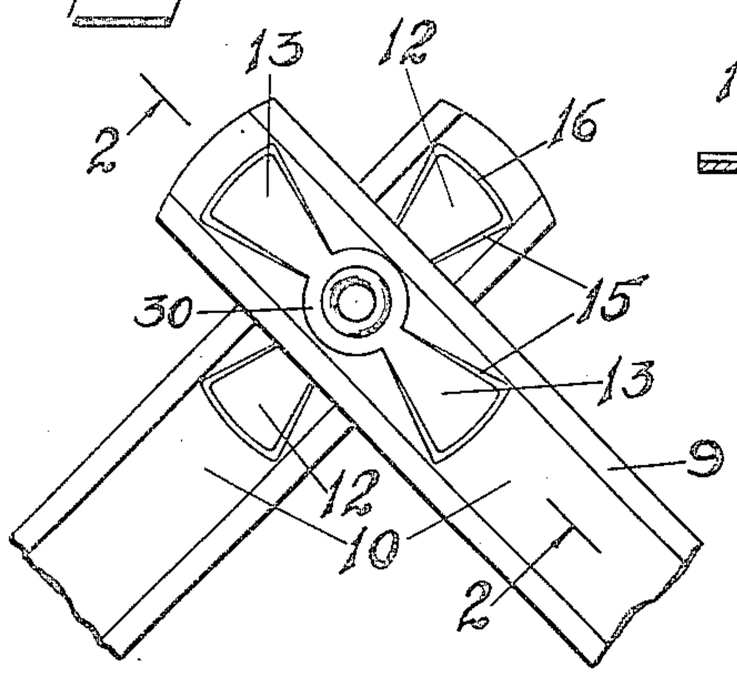


Fig. 2.

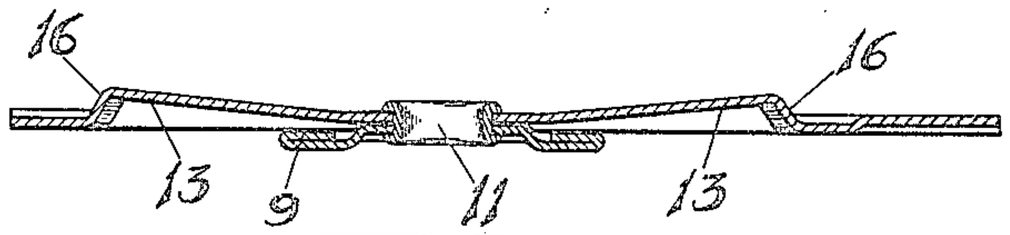


Fig. 3.

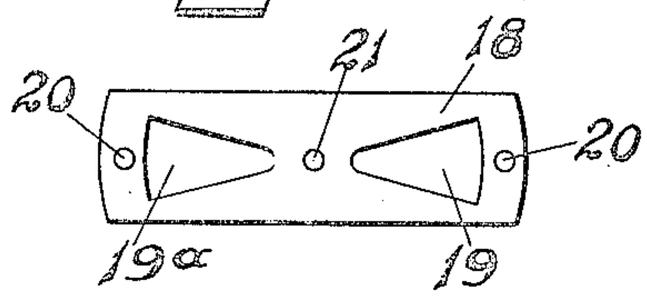


Fig. 4.

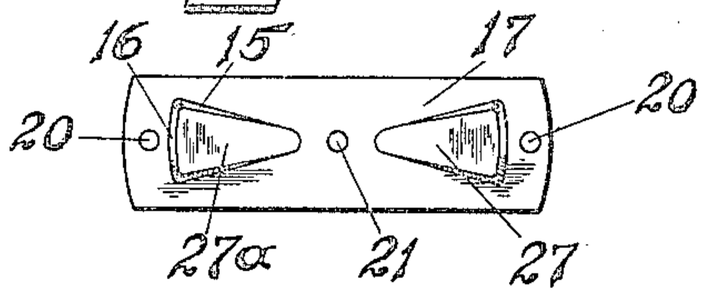


Fig. 5.

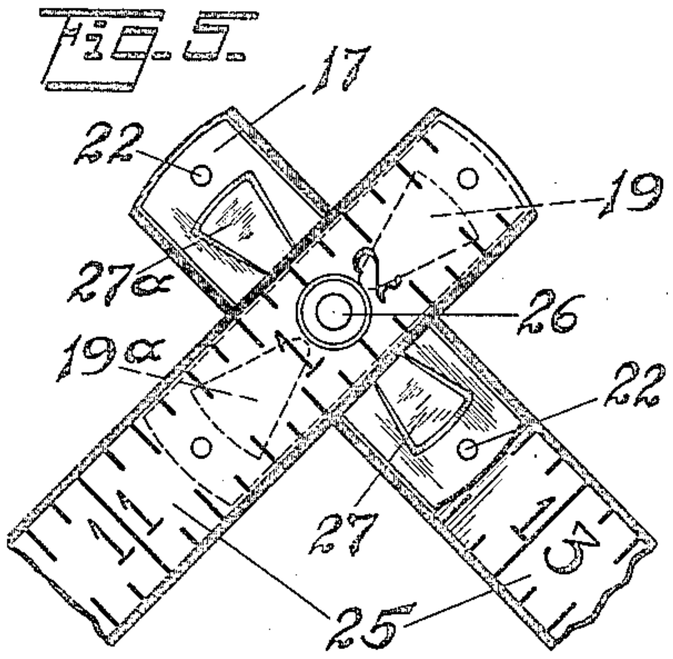


Fig. 6.

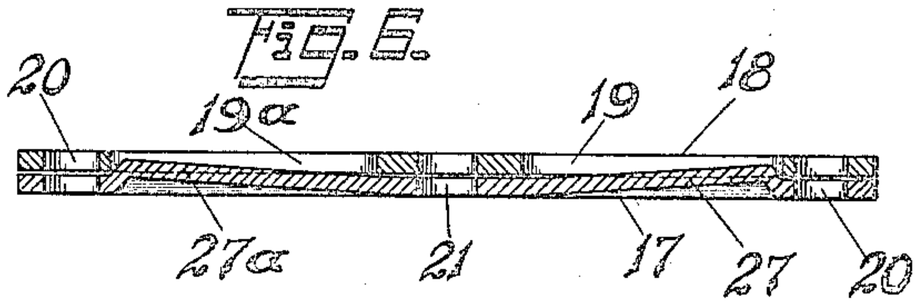


Fig. 7.

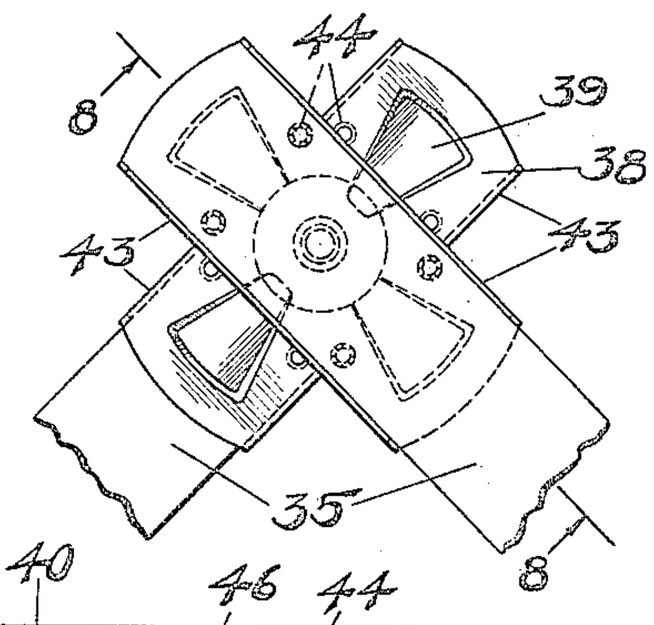
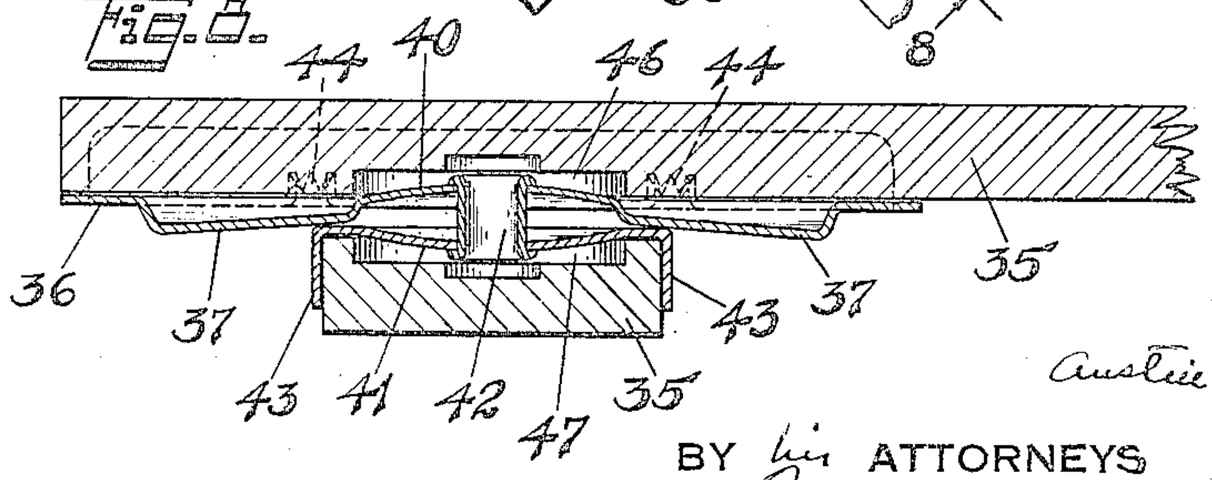


Fig. 8.



INVENTOR

Austin L. Stowell

BY his ATTORNEYS

Philbrook Lampert Rice & Kennedy

Patented May 9, 1933 1,907,459

UNITED STATES PATENT OFFICE

AUSTIN L. STOWELL, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE STANLEY WORKS, OF NEW BRITAIN, CONNECTICUT, A CORPORATION OF CONNECTICUT

FOLDING RULE

Application filed December 4, 1931. Serial No. 578,859.

This invention relates to folding rules.

It is an object of the invention to provide a folding rule such that the sections are latched in open or closed position without the use of extraneous spring means.

It is a further object of the invention to provide a sturdy, economical rule capable of long life, and more particularly one that will stand up under the greatest possible opening and closing movements of its sections.

With these general objects in view the invention consists in the features, combinations, details of construction and arrangements of parts which will first be described in connection with the accompanying drawing and then more particularly pointed out.

In the drawing—

Figure 1 is a plan view of part of a folding rule constructed in accordance with the invention and shown half way between open and closed position;

Figure 2 is a sectional view (enlarged) taken on the line 2—2 of Figure 1;

Figure 3 is a detail view showing in plan and removed, one latching element of a modified construction;

Figure 4 is a similar view of the complementary latching element;

Figure 5 is a plan view of part of a rule embodying the latching elements of Figures 3 and 4;

Figure 6 is a sectional view (enlarged) through the latching elements of Figures 3–5 showing the same in latching position but removed;

Figure 7 is a plan view of a further modification; and

Figure 8 is a sectional view (enlarged) taken on the line 8—8 of Figure 7.

Referring to the drawing and more particularly to Figures 3–6, the rule shown comprises adjacent rule sections 25. The sections are hinged together, as hereinafter described, and bear graduations, as shown, such that they are continuous when the sections are opened.

There is provided means for pivoting and clamping the sections together. As here shown as an example, the sections are connected by a double-headed rivet 26. This rivet not only provides a hinge pivot but clamps the sections together tightly and serves as an anchor or fulcrum in a manner later referred to.

The invention in its entirety includes cooperating latching shoulders on the respective sections, these shoulders being substantially radial to the pivot. The shoulders on one section having what may be termed the male latching element, may conveniently be formed as the sides of a wedge-shaped embossment. In the exemplification illustrated in Figures 3–6, this embossment is formed on a plate secured to the rule section. As there shown, secured to one rule section is a plate 17 in the form of a thin metal stamping. Struck up from the metal of this plate is a wedge-shaped latching element 27. That is, the face of the latching element slopes upwardly and outwardly from the pivot. The sides of this latching element, which form latching shoulders, are substantially radial to the pivot. The outer edge is substantially an arc of a circle of which the pivot is the center.

Secured to the other rule section is a female plate 18 also in the form of a thin metal stamping. This plate has a cut-out 19 of a shape and size to accord with the male latching element 27. This cut-out forms a recess for receiving latching element 27 in interlocking relation, the radial sides of the cut-out, by virtue of the thickness of the plate, constituting latching shoulders cooperating with the shoulders formed by the sides of male element 27.

If desired, the plate 18 may have an exact female counterpart of the latching element 27. In that case the rule section is rabbeted to accommodate the plate.

Both plates 17 and 18 have central holes 21 for the passage of pivotal rivet 26 and end holes 20 for nails, screws or rivets 22 by which the plates are secured to the respective rule sections. In the construction described and shown, the plates do not extend down over the rule edges but lie within the limits of the section faces. As a result the rule edges, in use, are unobstructed.

In order that the rule sections may be

latched in either open or closed position, latching elements are provided in reverse duplicate. That is, plate 17 has a duplicate but reversely disposed latching element 27ª, the two being symmetrically arranged with respect to the pivot. Plate 18 has a duplicate and similarly arranged cut-out 19ª.

In structures embodying the invention in its entirety, the sections are retained in latched position by the inherent resiliency of the section material. The sections may be formed of any suitable material, those shown in Figure 5 being of metal having a springy quality. When the sections are moved from the position of Figure 5 to full opened position, the sloping faces of elements 27, 27ª, exert a wedging action on the projecting ends of the rule sections. As a result of this action, the section ends, anchored by the clamping pivot, are both bent and twisted, whereby both longitudinal and torsional stresses are set up. When the latching elements come into registry the cooperating latching elements snap into interlocking relation and the stresses are relieved, except that there may be some initial stress remaining. In this position the sides of elements 27, 27ª, engage the shoulders forming the edges of cut-outs 19, 19ª, respectively. Since the wedges must again be interposed in order to break the joint in either direction, a break involves setting up the compound stresses again. As this is opposed by the inherent resiliency of the section material, the sections are held locked by this inherent resiliency. The joint is broken by exerting on the rule sections a sufficient force to overcome this resistance.

As will be apparent, the same actions take place when the sections are moved from the Figure 5 position to closed position except that in that case latching elements 27, 27ª, are received by recesses 19ª, 19, respectively.

The sides and ends of latching elements 27, 27ª, as appears more clearly in Figure 4, are beveled off or sloped slightly. This aids the riding out of the embossments from latching position and also aids in centering or bottoming the embossments to compensate for any inaccuracies or the like.

With the construction described, a firm latching or locking is obtained without the use of extraneous springs. Moreover, with latching elements having their sides or shoulders substantially radial to the pivot, the stresses are set up, upon breaking a joint, substantially all at once. That is, the setting up of the stresses takes place during a minimum angular movement of the section. As a result, any wiping or shearing action of the opposing surfaces that might tend to fatigue the metal or the like, is absent. In any event, it has been found that the construction described is capable of opening and closing a great number of times without loosening, breaking down, or otherwise impairing the joint.

Furthermore, with complementary latching shoulders that are substantially radial to the pivot, the rule sections are definitely positioned by the interlocking elements regardless of any play at the pivot. As a result, even though the pivot or its bearing should wear, the sections when interlocked in open position always take the same relative position and so retain the exact rule length of the initial assembly.

In the modification illustrated in Figures 7 and 8 the rule comprises two adjacent sections 35. Secured, as later described, to one section is a plate 36 having oppositely disposed male latching elements 37 like elements 27 above described. Secured to the other section is a plate 38 having corresponding female latching elements 39. Plates 36, 38, have struck-up concave central portions 40, 41, which face each other when the parts are assembled, as illustrated in Figure 8. The two plates are connected by a tubular rivet 42 passing through suitable holes in the centers of the struck-up portions 40, 41.

The plates 36, 38 are secured to the rule sections by bent-up sides or flanges 43 which grip the edges of the rule sections. As illustrated, the plates are also provided with prongs or spurs 44 struck up from the plate metal and which bite into the material of the rule sections to prevent any shifting of the parts.

The rule sections are recessed, as indicated at 46, 47, to accommodate the various parts of the joint.

With the construction just described, the stresses set up in the concave portions 40, 41, of the plates amplify the latching effects of the latching bosses. Moreover, with this construction, there is no through rivet and the scale markings and numbers may be carried across the joint without interruption.

In Figures 1 and 2 is illustrated a further modification in which the latching elements are provided without the use of extraneous plates. In this embodiment the rule sections 10 are formed of fairly thin steel strips having their edges turned over to provide strengthening ribs 9. The sections are pivoted and clamped together by means of a hollow rivet 11, having a bearing in bosses 30.

The lower section, as viewed in Figure 1, has a pair of reversely disposed male latching elements 12 like the elements 27 already described. These are formed by striking up the metal of the rule section itself. The other section is provided with complementary female latching elements 13 also formed by striking up the metal of the section. These elements 13 form recesses for receiving elements 12 in interlocking relation and the op-

eration is the same as that described in connection with Figures 3–6.

In the present drawing only two rule sections are shown. It is to be understood that as many sections as desired may be used, one section being jointed as described to the next.

What is claimed is:

1. A rule comprising adjacent sections, pivotal means clamping and hinging the sections together, one of said sections having a substantially triangular latching element the face of which slopes upwardly and outwardly from the pivot and the sides of which are substantially radial to said pivot, the other section having a cooperating recess for receiving said latching element in interlocking relation.

2. A rule comprising adjacent sections, pivotal means clamping and hinging the sections together, one of said sections having a substantially triangular latching element the face of which slopes upwardly and outwardly from the pivot and the sides of which are substantially radial to said pivot, the other section having a cooperating recess for receiving said latching element in interlocking relation, the sections being held in latched position by the inherent resiliency of the section material.

3. A rule comprising adjacent sections, pivotal means clamping and hinging the sections together, one of said sections having a substantially triangular latching element the face of which slopes upwardly and outwardly from the pivot and the sides of which are substantially radial to said pivot, the outer edge of said latching element lying substantially in an arc of which the pivot is a center, the other section having a cooperating recess for receiving said latching element in interlocking relation.

4. A rule comprising adjacent sections, pivotal means clamping and hinging the sections together, one of said sections having a pair of oppositely disposed substantially triangular latching elements symmetrically arranged with respect to said pivot, the faces of said elements sloping upwardly and outwardly from the pivot, the sides of said elements being substantially radial to the pivot, the other section having a pair of cooperating recesses similarly disposed with respect to the pivot for receiving said latching elements in interlocking relation.

5. A rule comprising adjacent sections, pivotal means clamping and hinging the sections together and including a plate on one of said sections, said plate having a raised latching element the face of which slopes upwardly and outwardly from the pivot and the sides of which are substantially radial to said pivot, a plate on the other section having a cooperating recess for receiving said latching element in interlocking relation.

6. A rule comprising adjacent sections, pivotal means clamping and hinging the sections together and including a plate on one of said sections, said plate having a raised latching element the face of which slopes upwardly and outwardly from the pivot and the sides of which are substantially radial to said pivot, a plate on the other section having a cooperating recess for receiving said latching element in interlocking relation, and means for securing said plates to the opposing faces of the respective rule sections to lie within the limits of said faces.

7. A rule comprising adjacent sections formed of thin metal, pivotal means clamping and hinging the sections together, one of said sections having a latching element struck up from the section metal, the face of said latching element sloping upwardly and outwardly from the pivot and the sides of the element being substantially radial to said pivot, the other section having a cooperating female latching element struck up from the metal of its section, the sections being held in latching position by the inherent resiliency of the metal.

8. A rule comprising imperforate adjacent sections recessed on their opposing faces, plates secured to said opposing faces, a rivet pivotally connecting said plates together and entirely housed within said recesses, one of said plates having a raised latching element the face of which slopes upwardly and outwardly from the pivot and the sides of which are substantially radial to said pivot, the other plate having a cooperating recess for receiving said latching element in interlocking relation.

9. A rule comprising imperforate adjacent sections recessed on their opposing faces, plates secured to said opposing faces, said plates having perforate oppositely disposed concave portions seated in said recesses, a rivet pivotally connecting said plates through said perforations and entirely housed within said recesses, one of said plates having a raised latching element the face of which slopes upwardly and outwardly from the pivot and the sides of which are substantially radial to said pivot, the other plate having a cooperating recess for receiving said latching element in interlocking relation.

In testimony whereof, I have hereunto set my hand.

AUSTIN L. STOWELL.