United States Patent [19]

Rothermel

[11] **3,709,535**

[45] **Jan. 9, 1973**

[54] HINGE IRON FOR POSTURE CHAIR

[76] Inventor: **Heinz Rothermel,** 604 Bloor Street West, Apt. B, Toronto, Ontario, Canada

[22] Filed: **Jan. 18, 1971**

[21] Appl. No.: **107,025**

[52] **U.S. Cl.** **297/306,** 297/358, 297/363

[51] **Int. Cl.**.....**A47c 7/44**

[58] **Field of Search**.....297/300, 304, 306, 305, 353, 297/358, 363; 248/383, 374

[56] **References Cited**

UNITED STATES PATENTS

3,601,444	8/1971	Doerner	297/300
590,455	9/1897	Goodenough	248/383
2,093,319	9/1937	Herold	297/304 X
1,501,181	7/1924	Peters	297/305
3,339,973	9/1967	Doerner	297/300
1,932,618	10/1933	Gabb	297/306 X
1,681,643	8/1928	Kimbro	297/363

FOREIGN PATENTS OR APPLICATIONS

927,153	5/1963	Great Britain	297/353
581,679	8/1933	Germany	297/304

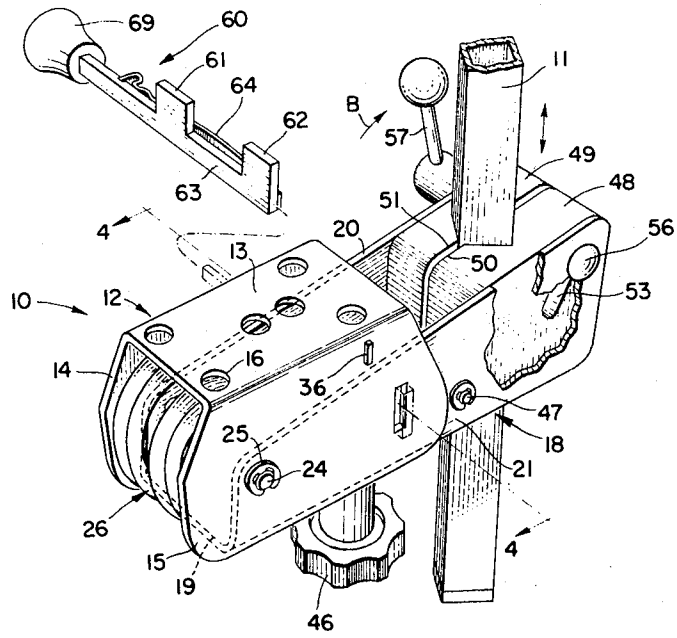
Primary Examiner—Francis K. Zugel

Attorney—George A. Rolston

[57] **ABSTRACT**

Spring-biassed hinge iron for a posture chair which hinge iron is readily adjustable by the user even while such a person is seated on the chair.

8 Claims, 5 Drawing Figures



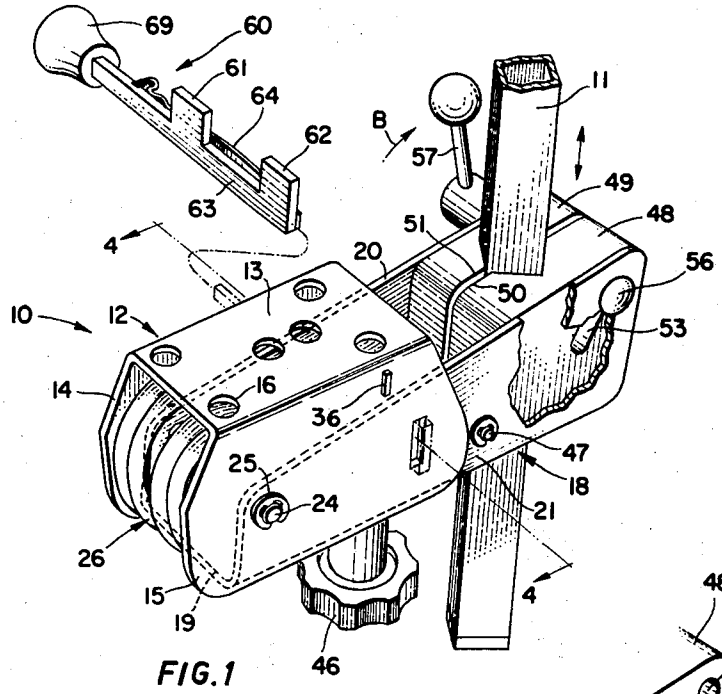


FIG. 1

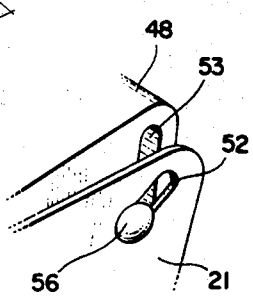


FIG. 3

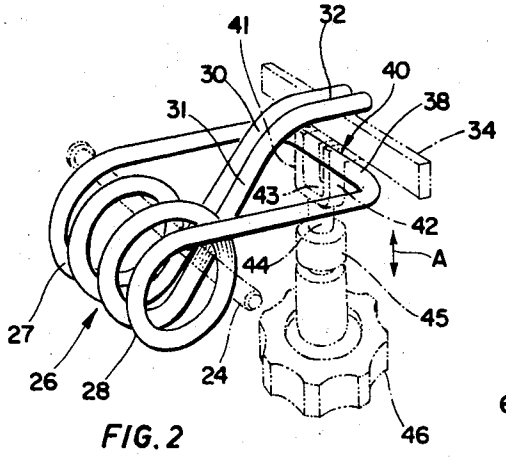


FIG. 2

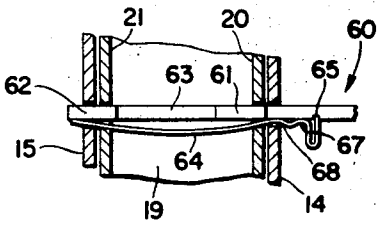


FIG. 5

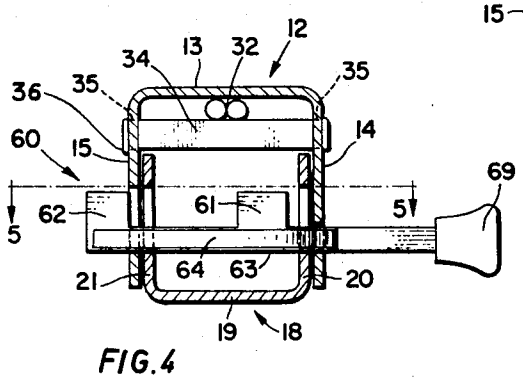


FIG. 4

Inventor

HEINZ ROTHERMEL

by: George A. Rolston

HINGE IRON FOR POSTURE CHAIR

The present invention relates to spring-biased hinge irons and more particularly to hinge irons especially suited for use in the construction of postural chairs of the type used by stenographers, telephone operators and others. More particularly, the present invention relates to a hinge iron specifically suited for adjustably securing a back rest supporting post on the seat of such a posture chair.

BACKGROUND OF THE INVENTION

Many spring-biassed hinge irons for the aforesaid purpose have heretofore been proposed. Such previously proposed hinge irons can generally be classified into those incorporating torsion bar systems and those utilizing helical torsion springs. The known use of torsion bars has the disadvantage that such bars are not only expensive but, in order to obtain an effective spring-biassing action, they must be relatively large and cumbersome. Their use is consequently not truly consistent with good aesthetic design.

The known use of helical torsion springs has also presented several disadvantages. For instance, many known hinge irons incorporating helical torsion springs have also been relatively cumbersome and have been difficult to adjust by the user.

Many such examples of posture chair tilting systems incorporating helical coil springs are shown in the patent art, including for example, U.S. Pat. Nos. 594,679; 681,566; 2,087,254; 2,398,072; 1,932,618; and 3,072,436. Some of these systems relate to the tilting of the seat itself, others relate to the tilting of the back relative to the seat, and still others relate to the tilting of both the seat and the back, relative to one another, or together in unison. In addition, similar systems are shown in Belgian Letters Patent 524,012, and French Letters Patent 1,227,023. With particular reference to U.S. Pat. No. 3,072,436, E. R. Moore, it will be noted that this patent shows a system in which the back rest is tiltable relative to the base of the chair, and also relative to the seat cushion, being arranged to tilt about a predetermined axis, with the helical coil spring being located around such axis, with one end of the spring engaging a portion of the back rest system, and the other end of the spring being adjustable by means of a threading rod and manually operable nut.

A recent example of such a helical spring system, incorporating only minor variations over the Moore system is shown in U.S. Pat. No. 3,339,973, J.T. Doerner (corresponding to Canadian Letters Patent 771,456). The Doerner spring system appears to have little if any novelty as compared with the Moore disclosure, and particularly, the embodiments of FIGS. 5, 6, 7 and 8 of the Doerner patent would appear to operate, at least as far as the movement of the back rest is concerned, in precisely the same way as the backrest movement in the Moore disclosure.

Thus, it is evident from an examination of this art, and in particular from a comparison of the Doerner patent with earlier patents, the design in this field has become stagnated. In particular, the arrangement of the back rest pivoting mechanism, incorporating such helical springs, in the cumbersome manner shown in Doerner and also in Moore, presents serious problems, both from the viewpoint of operation of the adjustment mechanism itself, and also from the viewpoint of the design as an aesthetically appealing chair. Thus, in both Moore and Doerner the designer is faced with a problem that the hardware constitutes a large and bulky mass extending beneath the seat cushion of the chair which cannot be concealed in any way.

Clearly, a more compact enclosed form of design is desirable, with the adjustment means being more readily accessible to the occupant of the chair.

It is a principal object of this invention to provide a spring-biassed hinge iron particularly suited for use in a posture chair of the aforementioned type and which iron is characterized not only by being highly effective in its operation, but also by having a particularly compact configuration.

Yet another object of this invention is to provide a spring-biassed hinge iron for the aforementioned purpose and which hinge iron is readily adjustable by the user even while such a person is seated on the chair.

A further object of this invention is to provide a spring-biassed hinge iron which can be mounted solely on the undersurface of the chair seat thereby in no way restricting the design and construction of the seat cushion.

Another object of this invention is to provide a hinge iron which, when used to mount a back rest supporting post on the seat of a posture chair, can be mounted completely near the rear edge of the seat so avoiding any need for redesign of the seat-supporting base and pivot.

In accordance with a preferred feature of this invention, another object thereof is to provide a spring-biassed hinge iron which can easily be constructed so that its relatively pivotal component parts can be releasably locked, if desired, against relative pivotal movement.

Other objects of the invention will become apparent as the description herein proceeds.

BRIEF SUMMARY OF THE INVENTION

The present invention provides in general, a spring-biassed hinge iron which comprises a first hinge bracket; a second hinge bracket; a pivot pin extending through the first and second hinge brackets pivotally to interconnect said hinge brackets; a helical torsion spring disposed about said pivot pin, having first and second axially spaced apart extension fingers, and accommodated generally within said hinge brackets, said extension fingers terminating on the same side of said pivot pin and engaging said hinge brackets whereby said spring is effective resiliently to urge said brackets away from each other; securing means securing said extension fingers of said helical torsion spring to said brackets; mounting means on said first hinge bracket for securing it to a first structural member; and mounting means on said second hinge bracket for securing it to a second structural member.

In accordance with a particularly useful feature of this invention, the aforementioned torsion spring is formed with two axially spaced apart sections of opposite handednesses terminating generally centrally along said pivot pin in rearwardly extending generally tangential extension fingers which are secured to the first hinge bracket by the first securing means. Such torsion spring sections then terminate at their axially

outer ends in generally tangential rearward extension fingers which are integrally formed with and interconnected at their outer ends by a transverse section which is in turn secured to the second hinge bracket by the second securing means.

In accordance with another useful but optional feature of this invention, a hinge iron in accordance therewith is provided with a locking bar extending through aligned openings in the side flanges of both the first and second hinge brackets for transverse movement between released and locking positions so as to prevent relative pivotal movement of the two hinge brackets when the locking bar is disposed in its locking position but to allow such relative movement when the locking bar is moved into its released position.

Other features and advantages of the invention will become apparent as the description herein proceeds.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described merely by way of illustration with reference to the accompanying drawings in which:

FIG. 1 is a perspective view partially cut away and showing a particularly useful embodiment of a spring-biassed hinge iron in accordance with this invention and also showing a back rest supporting post clamped to a second hinge bracket of that hinge iron;

FIG. 2 is a perspective view of a preferred form for the torsion spring incorporated in the hinge iron shown in FIG. 1 and showing in phantom outline one suitable mechanism for adjusting the extent of the spring bias acting between its two hinge brackets;

FIG. 3 is a fragmentary perspective view showing details of a pivot mechanism incorporated in the hinge iron of FIG. 1 to allow adjustment of the angular position of a back rest supporting post relative to the second hinge bracket on which it is mounted;

FIG. 4 is a vertical transverse section through the hinge iron of FIG. 1 when taken as indicated by the arrows 4—4 thereon; and

FIG. 5 is a fragmentary generally horizontal section when taken as indicated by the arrows 5—5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The hinge iron generally indicated at 10 in FIG. 1 of the accompanying drawings is shown therein as being intended for mounting a back rest supporting post 11 on the seat of a posture chair of the type used by stenographers, telephone operators and others. Although the ensuing description herein will primarily be directed to such an application of a hinge iron in accordance with this invention, it should be stressed that the hinge irons of this invention can be used in other applications and that this invention is in no way restricted to hinge irons intended solely for use in such posture chairs.

The hinge iron 10 comprises a first or upper hinge bracket generally indicated at 12 and including a base web 13 and spaced apart downwardly extending side flanges 14 and 15. Mounting holes 16 are formed in the web 13 for securing the bracket 12 to the undersurface of a chair seat (not shown). The hinge iron 10 also comprises a second or lower hinge bracket generally indicated at 18 and including a base web 19 and spaced apart upwardly extending side flanges 20 an 21 disposed inwardly of the side flanges 14 and 15 of the upper hinge bracket 12. A headed pivot pin 24 extends through aligned openings in the side flanges 14 and 15 of the upper bracket 12 and in the side flanges 20 and 21 of the lower hinge bracket 18 to permit relative pivotal movement of the two hinge brackets 12 and 18. Lock washers 25 retain the pivot pin in position. The base webs 13 and 19 of the upper and lower hinge brackets 12 and 18 respectively and the side flanges 14, 15 and 20, 21 of the brackets 12 and 18 respectively generally define an enclosure within which a torsion spring generally indicated at 26 is accommodated and disposed in a manner which will be described in greater detail hereinafter.

The torsion spring 26 comprises axially spaced apart sections 27 and 28 of opposite handednesses. Generally centrally of the spring 26, the spring sections 27 and 28 terminate in rearwardly and upwardly projecting generally tangential extension fingers 30 and 31 respectively which are deformed at their outer or rearward ends as at 32 so as to be disposed generally parallel to the web 13 of the upper hinge bracket 12 for engagement by the top edge surface of a transverse element 34 extending between the side flanges 14 and 15 of the upper hinge bracket 12 above the upper edges of the side flanges 20 and 21 of the lower hinge bracket 18, the transverse element 34 being supported in appropriate openings 35 provided for this purpose in the side flanges 14 and 15 of the upper hinge bracket 12. The ends of the transverse element 34 are upset as at 36 to retain it in position.

At their axially outer ends, the sections 27 and 28 of the torsion spring 26 extends generally tangentially, rearwardly and slightly downwardly and are interconnected at their outer or rearward ends by a transversely disposed and integrally formed section 38 disposed generally below the transverse element 34. The transversely disposed section 38 is secured to the web 19 of the lower hinge bracket 18 in an adjustable manner as will be described hereinafter in greater detail.

It will be understood that the action of the spring 26 is resiliently to resist relative opening movement of the transverse section 38 and the extension fingers 30 and 31, ie. to resist downward movement of the lower hinge bracket 18 relative to the upper hinge bracket 12 about the pivot pin 24. It will further be understood that, since the back rest supporting post 11 is mounted on the lower hinge bracket 18, the action of the spring 26 is to restrict rearward pivotal movement of the back rest (not shown) mounted on the post 11 relative to the chair seat (not shown).

To permit adjustment of the extent to which the spring 26 acts to resist relative pivotal movement of the upper and lower hinge brackets 12 and 18, the second securing means by which the transverse section 38 is secured to the web 19 of the lower hinge bracket 18 includes a shoe generally indicated at 40 comprising spaced apart stirrup arms 41 and 42 carried by a web 43 from which a threaded bolt 44 extends through a washer 45 disposed below an opening (not shown) in the base web 19 of the lower hinge bracket 18. An internally threaded adjusting handle 46 screws onto the bolt 44 below the web 19 and serves to raise and lower the shoe 40 as indicated by the double-headed arrow A.

The side flanges **20** and **21** of the lower hinge bracket **18** extend rearwardly beyond the upper hinge bracket **12** and have pivotally mounted therebetween about a headed pivot pin **47** a pair of post-clamping shoes **48** and **49**. The shoes **48** and **49** are formed in their opposed faces **50** and **51** with mutually opposed recesses defining an opening in which the supporting post **11** is longitudinally adjustably received.

Slotted openings **52** are formed in the side flanges **20** and **21** in intersecting alignment with slotted openings **53** formed in the shoes **48** and **49**. A headed locking bolt **56** extends through the slotted openings **52** and **53** and a clamping handle **57** is screwed onto one end of the bolt **56** for the purpose of clamping the shoes **48** and **49** and the post **11** in a fixed angular position relative to the lower hinge bracket **18**. Furthermore, by releasing the clamping handle **57** as indicated by the arrow B, the post **11** can be moved longitudinally, i.e. generally vertically, through the clamping shoes **48** and **49** for the purpose of adjusting the height of the back rest (not shown) mounted on the upper end of the post **11**.

It will be understood that it is not essential to provide slotted openings such as the openings **52** and **53** in both the side flanges **20** and **21** of the lower hinge bracket **18** as well as in the shoes **48** and **49** and that the desired pivotal adjustment of the post **11** could also be obtained by the provision of curved openings in the side flanges **20** and **21**, such openings being centered on the pivot **47**.

In accordance with another feature of this invention, the hinge iron **10** is also provided with means for locking the upper and lower hinge brackets **12** and **18** to prevent their relative pivotal movement about the pivot pin **24**. In the construction shown in the accompanying drawings, such a locking means comprises a locking bar generally indicated at **60** and which is slidingly supported in aligned openings formed in the side flanges **14**, **15** and **20**, **21** of the upper and lower hinge brackets **12** and **18** respectively. The locking bar **60** is formed with upstanding lugs or ears **61** and **62** which have essentially the same height as the openings in the side flanges, but are separated by a section **63** of reduced height. A bowed strip spring **64** is suitably seated at **65** in one side of the locking bar **60** and is formed at one end with recesses **67** and **68** which selectively engage the side flange **14** of the upper hinge bracket **12** according to the transverse position of the locking bar **60**. A handle **69** is provided on the outer end of the bar **60** to permit manual adjustment of its transverse position in the hinge iron **10**. In one of its transverse positions as actually shown in FIG. **5**, the upstanding ears **61** and **62** are received within the aforementioned openings in the side flanges **14**, **15** and **20**, **21** of both the upper and lower hinge brackets **12** and **18** respectively and, therefore, then serve positively to lock the two brackets **12** and **18** together. By moving the locking bar **60** transversely relative to the hinge iron **10**, the upstanding ears **61** and **62** are moved out of the openings in the side flanges **14**, **15** and **20**, **21** and then no longer serve to prevent relative pivotal movement of the two hinge brackets **12** and **18**.

In operation, assuming the hinge iron **10** to be installed in position on a typical posture chair, the occupant of the chair, when sitting in it, may lean backwardly in it against the back rest cushion (not shown), thereby swinging the column **11** rearwardly, and causing the bracket **18** to swing downwardly about the pivot pin **24**, the bracket **12** remaining stationary, being fastened to the underside of the seat of such chair, and being, therefore, immovable.

If the occupant wishes to increase or decrease the spring pressure exerted on the back by means of the helical spring **26**, the occupant without moving from the chair can simply reach underneath the rear part of the chair and operate the hand wheel **46** to tension or release the spring **26**.

If the occupant of the chair wishes to adjust the angular position, or inclination of the column **11**, and, therefore, bring the back rest cushion either closer or further away from his back, then without leaving the chair, he simply grabs the handle **57**, unwinds it two or three turns, and simply pulls the column **11** either forwardly or swings it rearwardly. Obviously, releasing of the handle **57** will also permit the height of the column **11** to be adjusted by merely sliding it upwardly or downwardly.

In the event that the occupant of the chair wishes to prevent the back rest cushion from swinging at all, then he merely grasps the handle **69** of the locking bar **60** and pulls the locking bar **69** outwardly, that is to say towards the right-hand side of the chair, as shown in FIG. **1**, in which case the lugs **61** and **62** will then engage within the brackets **12** and **18**, and prevent the same from swinging relative to one another.

It will be thus seen that by the practice of the invention, a virtually totally enclosed compact hinging mechanism is provided for a back rest cushion, with all of the controls being located towards the back of the chair, and not being completely concealed or obstructed by being located directly underneath the seat, and accordingly, such controls can all be readily handled while sitting in the chair. At the same time, by virtue of the fact that the entire structure is substantially enclosed, it will attract somewhat less dust, and will not tend to leave dirt or grime on the hands or clothes of the occupant.

The foregoing is a description of the preferred embodiment of the invention which is given here by way of example only.

The invention is not to be taken as limited to any of the specific features as disclosed, but comprehends all such variations thereof as come within the scope of the appended claims.

What I claim is:

1. A spring-biassed hinge iron which comprises:

a first hinge bracket including a base web and spaced apart side flanges;

a second hinge bracket including a base web and spaced apart side flanges;

a pivot pin extending through said side flanges of each of said first and second hinge brackets pivotally to interconnect said hinge brackets with said base webs and said side flanges thereof generally defining an enclosure;

a helical torsion spring disposed about said pivot pin, having first and second axially spaced apart extension fingers and accommodated generally within said enclosure defined by said hinge brackets, said first and second extension fingers of said torsion spring terminating on the same side of said pivot pin;

securing means securing respective said extension fingers of said helical torsion spring to said first hinge brackets, whereby said first and second hinge brackets are effectively spring-biassed by said torsion spring against relative pivotal opening movement about said pivot pin;

locking bar means extending through at least part of said first and second hinge brackets and being transversely movable between locked and released positions for locking or permitting relative hinge-ing movement between said hinge brackets;

bar securing spring means associated with said locking bar means for holding same in either said position;

a first mounting means on said first hinge bracket for securing it to a first structural member; and

a second mounting means on said second hinge bracket for securing it to a second structural member.

2. A spring-biassed hinge iron as claimed in claim 1 including first and second securing means adapted adjustably to secure a respective one of said first and second extension fingers of said torsion spring to a respective one of said first and second hinge brackets to adjust the action of said torsion spring in biassing said first and second hinge brackets against said relative pivotal opening movement thereof.

3. A spring-biassed hinge iron as claimed in claim 1 in which said second hinge bracket is adapted to have an elongated second said structural member adjustably secured thereto by said second mounting means for longitudinal adjustment of said second structural member relative to said second hinge bracket between said side flanges thereof and for bodily pivotal adjustment of said elongated structural member about a pivot axis generally parallel to said pivot pin.

4. A spring-biassed hinge iron as claimed in claim 3 in which said side flanges of said second hinge bracket extend rearwardly of a rearward edge of said base web of said first hinge bracket, and which hinge additionally comprises a pair of clamping shoes pivotally mounted on the rearward extensions of said side flanges of said second hinge bracket between said side flange extensions thereof and about a pivot axis generally parallel to said pivot pin, said shoes being provided in opposed faces thereof with mating surfaces defining a recess in which said elongated second structural member is receivable, and releasable clamping means associated with said extensions of said side flanges of said second hinge bracket and adapted releasably to hold said extensions together so as releasably to clamp the elongated structural member between said clamping shoes.

5. A spring-biassed hinge iron as claimed in claim 1 in which said torsion spring comprises two axially spaced apart sections of opposite handednesses terminating generally centrally along said pivot pin in rearwardly extending generally tangential extension fingers which are secured to said first hinge bracket by a first said securing means, and said torsion spring sections terminating at their axially outer ends in generally tangential rearward extension fingers which are integrally formed with and interconnected at their outer ends by a transverse section which is in turn secured to said second hinge bracket by a second said securing means.

6. A spring-biassed hinge iron as claimed in claim 5 in which said first securing means comprises a transverse element extending between said side flanges of said first hinge bracket rearwardly of said pivot pin and generally terminally engaging said first extension fingers of said torsion spring with said first extension fingers disposed between said transverse element and said base web of said first hinge bracket, and in which said second securing means comprises a shoe engaging said transverse section interconnecting said second extension fingers of said torsion spring and disposed between said shoe and said base web of said second hinge bracket, and a screw means interconnecting said web of said second hinge bracket and said shoe whereby said shoe can be positionally adjusted relative to said second hinge bracket in turn to adjust the spring bias restraining relative angular pivotal opening movement of said first and second hinge brackets about said pivot pin.

7. A spring-biassed hinge iron as claimed in claim 6 wherein said locking bar extends through aligned openings in said side flanges of both said first and second hinge brackets for transverse movement between released and locking positions essentially to prevent relative pivotal movement of said hinge brackets when said locking bar is disposed in said locking position but to allow such relative pivotal movement of said first and second hinge brackets when said locking bar is disposed in said released position thereof, and including notch means in said locking bar registering with portions of at least one of said flanges in said released position.

8. A spring-biassed hinge iron as claimed in claim 7 wherein said bar securing spring means comprises a spring blade member and having detent means formed therein adapted releasably to retain said locking bar in either of said released and locking positions thereof.

* * * * *