

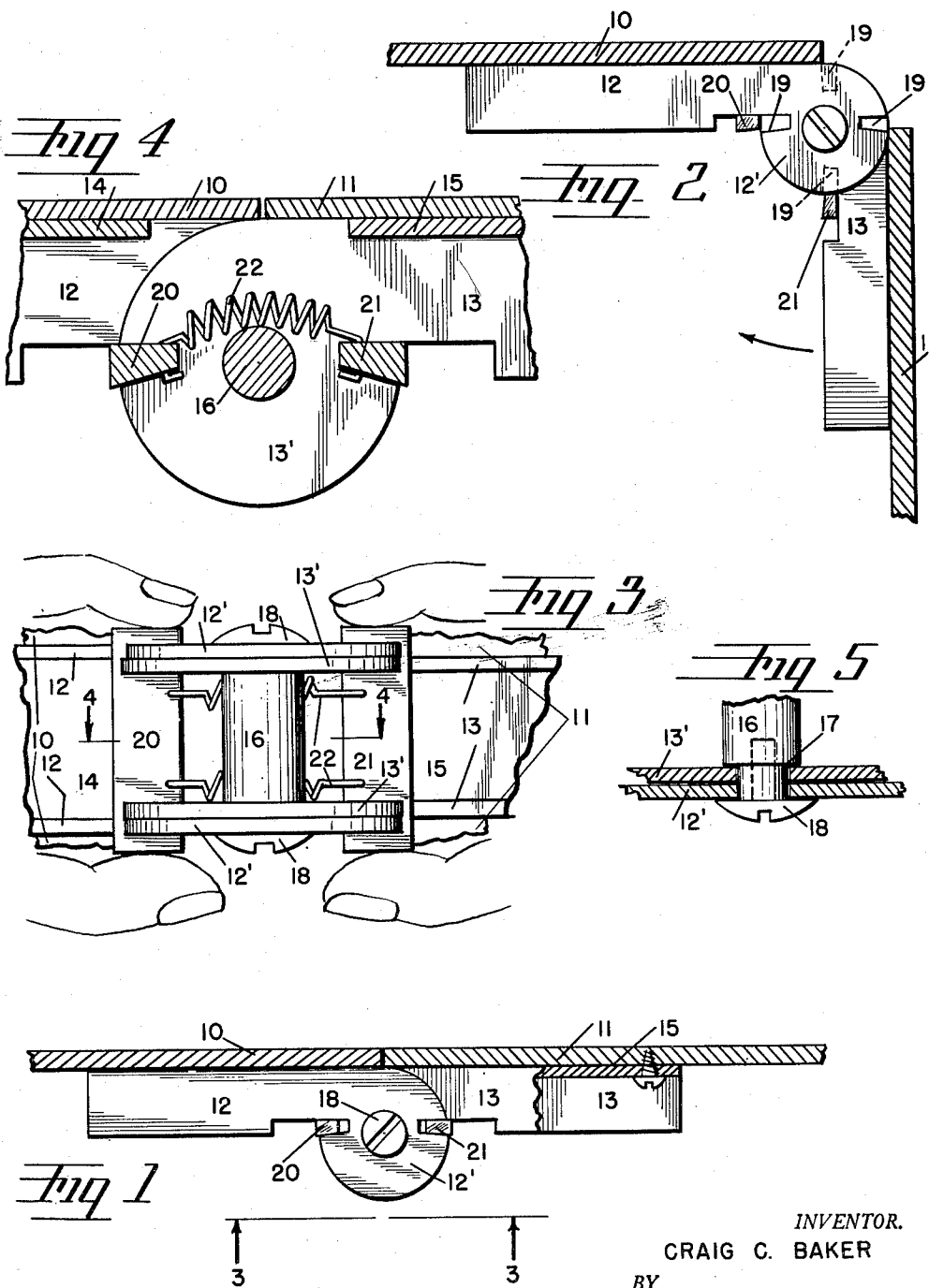
April 29, 1952

C. C. BAKER
LOCKING HINGE

2,594,533

Filed Jan. 3, 1950

3 Sheets-Sheet 1



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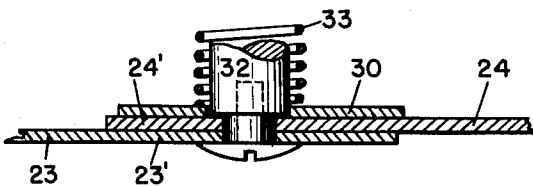
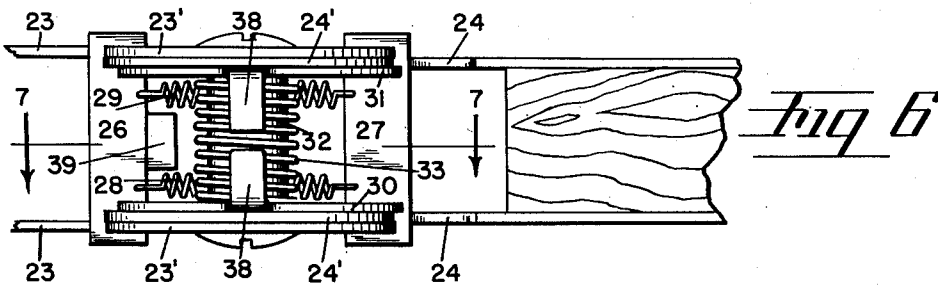
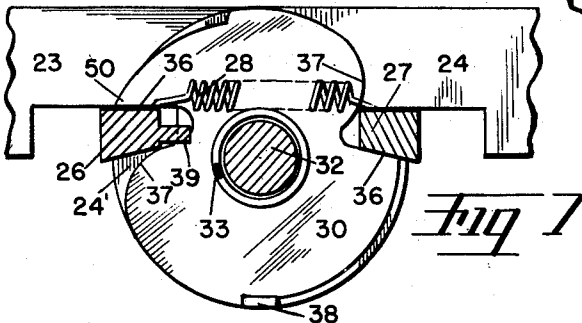
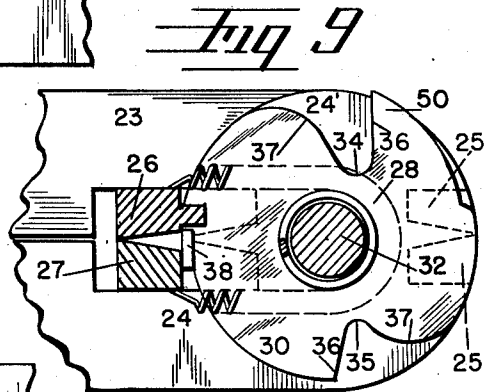
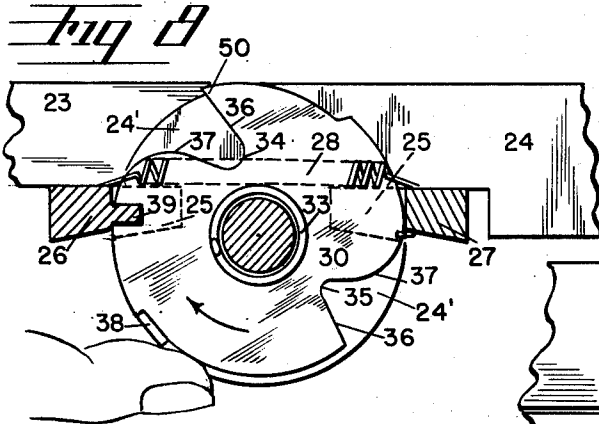
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3 Sheets-Sheet 2



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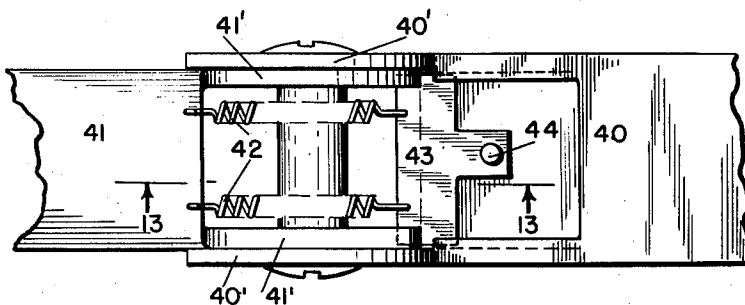
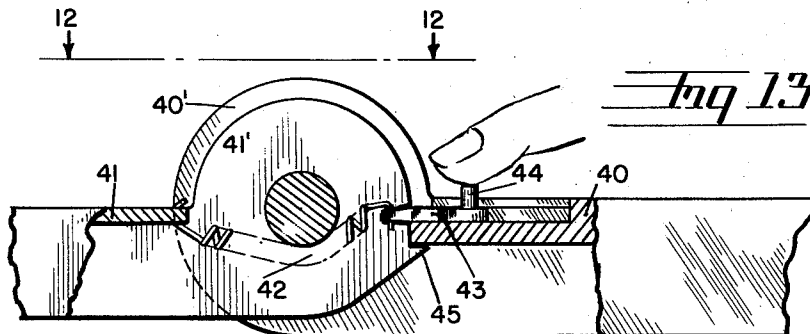
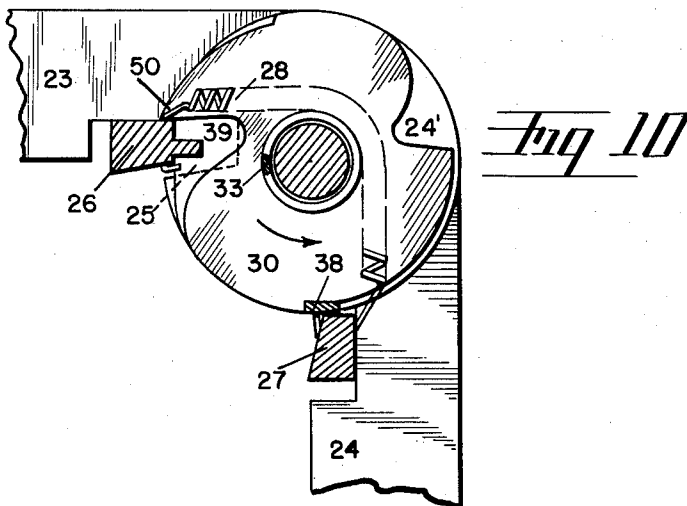
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3 Sheets-Sheet 3



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2,594,533

LOCKING HINGE

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Application January 3, 1950, Serial No. 136,530

6 Claims. (Cl. 16-144)

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This invention relates in general to a hinge of the type capable not only of serving in the usual capacity as a hinge but also of being locked in a desired, predetermined position, and thus of holding the hingedly-connected members in locked desired position with respect to each other.

More specifically this invention relates to a hinge adapted to connect one member to another or to connect one member to its support, for limited pivotal movement, but in such manner that the member can be locked in extended or predetermined position with respect to the other member or support by the hinge, and nevertheless, when not so locked, can have pivotal or hinged movement with respect to the other member or support.

An object of the invention is to provide an improved hinge which will automatically become locked when the hinged parts are swung to an opened or predetermined position with respect to each other.

Another object of this invention is to provide an improved locking hinge of the type above indicated which can be quickly and easily unlocked by a simple manual operation.

An additional and important object of the invention is to provide a locking hinge which will hold the hinged parts firmly in the desired or predetermined locked position and which will continue to do so regardless of any ordinary wear of any parts of the hinge or locking elements.

A further object of this invention is to provide an improved locking hinge which will be practical and simple in construction, convenient in size, inexpensive to manufacture, and capable of use in a variety of structures.

The invention resides in the novel construction of the parts and elements, and in their special combination and arrangement, as hereinafter described. In the following description, reference is made to the accompanying drawings, in which:

Fig. 1 is a side elevation of one form of my locking hinge showing the same in maximum open locked position;

Fig. 2 is a similar side elevation showing the same in partly open unlocked position;

Fig. 3 is a bottom plan view of the open locked hinge, taken on line 3-3 of Fig. 1, but drawn to a slightly larger scale, and illustrating the manner in which my hinge, when made in this particular form, is manually unlocked;

Fig. 4 is a sectional elevation of the open locked hinge taken on line 4-4 of Fig. 3;

Fig. 5 is a fragmentary sectional plan view showing one end of the hinge pivot pin;

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Fig. 6 is a bottom plan view, similar to Fig. 3, but showing a modified form in which my hinge may be made and showing the hinge also in open locked position;

Fig. 7 is a sectional elevation on line 7-7 of Fig. 6;

Fig. 8 is a similar sectional elevation illustrating the manner in which the hinge is first manually unlocked in order to permit the hinged parts to move out of the fully opened locked position;

Fig. 9 is a corresponding sectional elevation showing the hinge in completely closed unlocked position;

Fig. 10 is a further corresponding sectional elevation showing the hinge moving back towards fully opened position;

Fig. 11 is a fragmentary sectional plan view showing one end of the hinge pin and adjacent members;

Fig. 12 is a plan view of a further modified form in which my hinge may be made, the view being taken on line 12-12 of Fig. 13; and

Fig. 13 is a sectional elevation on line 13-13 of Fig. 12 and illustrating the manner in which this form of my hinge is manually unlocked.

Referring first to Figs. 1-5 inclusive, the reference characters 10 and 11 indicate in general two members which are connected together by means of the hinge. The locking hinge itself includes two pairs of spaced metal hinge elements 12, 12 and 13, 13 each pair being joined by the integral cross webs 14 and 15 respectively, each pair of elements and connecting web constituting one wing of the hinge and the two wings being secured to the two members 10 and 11 respectively.

The connected pair of hinge elements 13, 13 are so spaced that they extend inside of the hinge elements 12, 12 as shown in Fig. 3. The adjacent overlapping inner ends of these elements are circular in shape, these circular portions being designated by the reference characters 12', 12' and 13', 13' respectively and these circular registering portions are pivotally mounted on a common hinge pin or axial shaft 16. Each end of the shaft 16 has a portion 17 (Fig. 5) of smaller diameter on which the elements 12, 12 and 13, 13 are pivotally mounted, and broad headed screws 18, secured in threaded recesses in the ends of the shaft 16 respectively, aid in holding the respective adjacent hinge elements and shaft together.

Each of the circular portions 12', 12' and 13', 13' has a pair of diametrically opposite cut-out sections 19 (Fig. 2) so shaped as to accom-

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moderate a pair of wedge-shaped locking blocks 20 and 21 which extend transversely across the two pairs of elements in the relative positions shown in Figs. 1 to 4 and with their ends extended a short distance beyond the outward faces of the circular portions 12', 12' as shown in Fig. 3. These locking blocks 20 and 21 are connected by a pair of coil springs 22 (Figs. 3 and 4) which extend around the shaft or hinge pin 16 and thus tend to pull the locking blocks towards each other and keep them from dropping out of the device.

When the hinge elements 12, 12 and 13, 13 are moved so that the members 10 and 11 to which they are attached are arranged at an angle of 180° with each other, and thus when the hinge is in fully opened position illustrated in Figs. 1 and 4, the two pairs of cut-out sections 19 of the portions 12', 12' will be in registration with the corresponding parts of cut-out sections respectively, in the portions 13', 13' and consequently the locking blocks 20 and 21 will be pulled by their springs into these registering cut-out sections, as illustrated in Figs. 1, 3 and 4. When the locked blocks 20 and 21 are in such position the hinge is in open locked position.

To unlock the hinge, the operator takes a locking block between a thumb and forefinger of each hand and pulls the blocks slightly apart until both blocks are moved out of the cut-out sections 19. Then the hinge elements are free to rotate with respect to each other to a maximum of 180°, and when the pairs of cut-out sections are moved out of registration the locking blocks 20 and 21 will remain in their outward unlocked position bearing against the peripheries of the circular portions 12', 12' and 13', 13'.

My hinge as thus far described might be used, for example, in attaching a drop leaf to a table. Thus when the drop leaf is swung up to horizontal position the hinge automatically locks and serves to hold the drop leaf in raised horizontal position until it is unlocked in the manner illustrated in Fig. 3.

It would also be possible to arrange the pairs of cut-out sections 19 of the circular portions 12', 12' and 13', 13' at a spaced interval of 90° instead of 180° when it is desired to have the two members 10 and 11 locked at right angles to each other. Thus, as a further example, in this manner my hinge could be used for attaching a drop shelf to a vertical wall or a folding leg to a table top.

As previously mentioned, and as shown in the drawings, the locking blocks 20 and 21 are wedge-shaped and the cut-out sections 19 are similarly shaped for proper engagement with the locking blocks. There is a particular advantage in having the locking blocks and the related cut-out sections wedge-shaped, for not only is the entry of the locking blocks into the cut-out sections facilitated, but the force exerted on the locking blocks by the springs, wedging the blocks into the cut-out sections to the fullest extent possible, also results in the hinge being firmly locked with all possibility of play in the locked sections eliminated. In other words, if the cut-out portions are properly formed the locking hinge becomes in a measure self-tightening, for ordinary wear of the locking blocks or of the opposed edges of the cut-out portions, or even of the hinge shaft will not result in any play in the hinge sections when locked. This feature, as apparent, is of particular importance, for example, when the locking hinge is used for attaching a folding leg

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to a table top, for in such construction the slightest amount of play in the locked elements would be sufficient to render the table leg wobbly or unsteady unless provided with separate bracing.

Another incidental advantage in the hinge as thus far described is the fact that the portions 12', 12' and the corresponding portions 13', 13' of the hinge elements have circular peripheries which move in the same orbits during movements of the hinge and their cut-out sections come into registration only when in locking position when engaged by the locking blocks. This prevents the possibility of any article or portion of material inadvertently catching on these hinge elements or being subjected to any scissor-like or pinching action when coming into contact with any part of the hinge in operation.

In the modified form of my invention illustrated in Figs. 6-11 inclusive the pairs of hinge elements 23, 23 and 24, 24 are similar to the elements 12, 12 and 13, 13 respectively, in the preceding figures and have the corresponding circular portions 23', 23' and 24', 24', with pairs of cut-out sections 25 similar to the cut-out sections 19 and similarly arranged. Also a pair of locking blocks 26 and 27 are similarly provided for locking engagement with the pairs of cut-out sections 25 when these are brought into registration respectively, the locking blocks 26 and 27 being connected by a pair of coil springs 28 and 29 in the manner previously described.

To facilitate the moving of the locking blocks 26 and 27 out into unlocked position, I provide a pair of specially shaped discs 30 and 31, rotatably mounted on the hinge pivot shaft 32 and positioned inside of the inner circular portions 24', 24' of the hinge elements respectively, as shown in Fig. 6. A coil spring 33 on the pivot shaft 32 holds the discs 30 and 31 against the circular portions 24', 24' of the hinge elements. The rotatable discs 30 and 31 are identical in shape and the shape of the disc 30 is clearly shown in Figs. 7-10 inclusive. Thus each disc 30 and 31 has a pair of similar, oppositely arranged, cut-out portions 34 and 35, each cut-out portion being formed so as to present one outwardly-extending substantially straight edge 36 and another outwardly leading curved cam-like edge 37. Each disc 30 and 31 also has a peripheral extension or finger lug 38 (Fig. 6) extending inwardly to enable the discs to be rotated in unison (in clockwise direction as viewed in Figs. 7 and 8) by the finger of the operator in the manner illustrated in Fig. 8.

When the hinge is in the fully opened and locked position indicated in Fig. 7, slight manual rotation of the pair of unlocking discs 30 and 31 (thus clockwise as illustrated in Fig. 8) will move the locking blocks 26 and 27 out of locking engagement with the pairs of cut-out sections 25 and thus permit the two unlocked hinged portions to be rotated with respect to each other and towards each other until the hinge finally reaches the fully closed position illustrated in Fig. 9.

Due to the outward pressure exerted against both discs 30 and 31 by the coil spring 33, causing these discs to have moderate frictional engagement with the adjacent circular portions 24', 24' respectively of the inner hinge element 24, the rotation of the hinge element 24 with respect to the hinge element 23 will tend to cause further rotation (in clockwise direction as viewed in Figs. 8 and 9) of the discs 30 and 31. Rotation of the discs 30 and 31 in this direction, however, is limited by a central, inwardly-extending lip 39 on

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the locking block 26, which, while the locking block 26 is in unlocked position, is adapted to engage the finger lugs 33 of the discs 30 and 31 to limit such rotation. The purpose of this is to prevent the discs 30 and 31 being rotated to such extent in that direction (clockwise) as to bring them out of unlocking engagement with the locking blocks 26 and 27, since this might result in the locking of the hinge in some other position than the fully opened position or predetermined position for locking. Similarly, when rotation of the hinge elements in opposite direction with respect to each other (for example, when hinge element 24 is moved counterclockwise from the position in Fig. 9 to the position of Fig. 10 and finally to the fully opened position of Fig. 7) it is necessary to limit the rotation of the discs 30 and 31 in the corresponding opposite direction so that these discs will continue to have unlocking engagement with the locking blocks until the hinge is moved to the desired predetermined or fully opened position. The perimeters of each of the discs 30 and 31 accordingly has a shoulder 50 extending a slight distance radially beyond the perimeters of the circular portions of the hinge elements and adapted to engage the locking block 26 when this locking block is in unlocked position, as illustrated in Fig. 10, to limit rotation of the discs 30 and 31 in the opposite (counterclockwise) direction.

Thus when the hinge is in open locked position, as illustrated in Fig. 7, a slight manual rotation of the discs 30 and 31 by the finger of the operator (clockwise as viewed in Fig. 8) will unlock the hinge, and the hinge will then remain unlocked in all positions to which the hinge elements are moved until the hinge is again returned to the fully opened position, whereupon it will automatically again become locked.

In the further modified form of my locking hinge illustrated in Figs. 12 and 13, only one locking block is employed. The hinge elements 40 and 41 have similar pairs of circular portions 40' and 41', 41' respectively, but the circular portions 41', 41' of the hinge element 41 are of smaller diameter than the circular portions 40', 40'. In this modified form a pair of cut-out sections is provided in the inner circular portions 41', 41' only, and the single locking block 43 is adapted to engage the cut-out sections of these inner circular portions 41', 41' when the hinge is in fully opened position, but the locking block 43 does not extend to the outer circular portions 40', 40'. Under some conditions it may be preferable not to have the locking block extending beyond the sides of the hinge if the extending ends of the block would be likely to catch on any material or object.

In this construction the locking block 43 slides on a portion of the cross web of the hinge element 40, and, like the locking blocks previously described, is attached to a pair of coil springs 42 which exert a force to pull the locking block 43 into locked position in the cut-out sections of the inner circular portions 41', 41'. These coil springs 42 have one end attached to the locking block 43, extend past the hinge shaft and have the other ends attached to the web of the other hinge element 41. An upstanding finger lug 44 is mounted on a rear extension of the locking block 43 to enable the locking block to be easily moved out of locking position by the finger of the operator, as illustrated in Fig. 13. The circular portions 41', 41' each have a projecting shoulder 45 adjacent the cut-out section and adapted to

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engage the underside of the web of the hinge element 40 when the hinge is swung to fully opened position so as to prevent the hinge members from moving beyond the fully opened position regardless of the position of the locking block 43.

As apparent, in this modified form my locking hinge also functions in substantially the same way as previously described, that is to say, when the hinge is swung to a predetermined or fully opened position the hinge will automatically become locked; slight finger manipulation of the locking block unlocks the hinge and permits the hinge to be moved to closed or partly closed position; and the hinge will not lock at any other position than the desired or fully opened position.

Obviously my locking hinge when made in any of the forms which I have illustrated and described can be employed in various uses including those indicated at the beginning of this specification. Further minor modifications might be made in the construction of my locking hinge without departing from the principle of my invention. For example, the springs for exerting the force necessary to move the locking block or blocks into locking and tightening position in the cut-out sections could be differently arranged or differently mounted. However the preferred examples of the ways in which my invention may be carried out I consider to be those which I have illustrated.

I claim:

1. In a hinge of the character described, a pair of spaced parallel hinge elements constituting one wing of the hinge, a second pair of similar spaced hinge elements constituting the other wing of the hinge, both pairs of said elements having circular portions concentrically mounted on a common hinge pin, the circular portions of said first mentioned pair of elements positioned adjacent the inside faces of the circular portions of said second mentioned pair of elements respectively, identical, transversely-aligned cut-out sections in the perimeters of the circular portions of said pairs of elements, a transversely-extending locking block of wedge-shaped cross section mounted on one wing of said hinge in contact with the perimeters of said circular portions of said elements and adapted for engagement with said cut-out sections, said cut-out sections so located on the perimeters of the circular portions of said pairs of elements that said sections will be in registration with said locking block when said hinge is opened to a predetermined desired position, a pair of coil springs having one end attached to said locking block and the other end attached on the other wing of said hinge extending across said hinge past said hinge pin and exerting a force to pull said locking block inwardly towards said hinge pin, whereby when said hinge is opened to said desired position said locking block will be automatically pulled by said springs into said cut-out sections to lock said hinge in said position.

2. In a hinge of the character described, a pair of spaced parallel hinge elements constituting one wing of the hinge, a second pair of identical spaced hinge elements constituting the other wing of the hinge, both pairs of said elements having circular portions of the same diameter concentrically mounted on a common hinge pin, the circular portions of said first mentioned pair of elements positioned adjacent the inside faces of the circular portions of said second mentioned pair of elements respectively, pairs of identical, transversely-aligned cut-out sections in the

perimeters of the circular portions of said pairs of elements, a pair of transversely-extending locking blocks of wedge-shaped cross section mounted on the respective wings of said hinge in contact with the perimeters of said circular portions of said elements and adapted for engagement with said pairs of cut-out sections respectively, said cut-out sections so located on the perimeters of the circular portions of said pairs of elements that said sections will be in registration with said locking blocks when said hinge is opened to a predetermined desired position, a pair of coil springs connecting said locking blocks extending across said hinge past said hinge pin and exerting a force to pull said locking blocks inwardly towards said hinge pin, whereby when said hinge is opened to said desired position said locking blocks will be automatically pulled by said springs into said pairs of cut-out sections respectively to lock said hinge in said position.

3. A hinge of the character described including a pair of spaced parallel hinge elements constituting one wing of the hinge, a second pair of similar spaced hinge elements constituting the other wing of the hinge, both pairs of said elements having circular portions of the same diameter concentrically mounted on a common hinge pin, the circular portions of said first mentioned pair of elements positioned adjacent the inside faces of the circular portions of said second mentioned pair of elements respectively, pairs of identical, transversely-aligned cut-out sections in the perimeters of the circular portions of said pairs of elements, a pair of transversely-extending locking blocks of wedge-shaped cross section mounted on the respective wings of said hinge in contact with the perimeters of said circular portions of said elements and adapted for engagement with said pairs of cut-out sections respectively, said cut-out sections so located on the perimeters of the circular portions of said pairs of elements that said sections will be in registration with said locking blocks when said hinge is opened to a predetermined desired position, a pair of coil springs connecting said locking blocks extending across said hinge past said hinge pin and exerting a force to pull said locking blocks inwardly towards said hinge pin, whereby when said hinge is opened to said desired position said locking blocks will be automatically pulled by said springs into said pairs of cut-out sections respectively to lock said hinge in said position, a pair of unlocking discs mounted on said hinge pin adjacent the inside faces of the circular portions respectively of said first mentioned pair of elements, each of said discs having peripheral cam edges adapted to engage said blocks when said discs are rotated in one direction, whereby to move said blocks out of locking engagement with said cut-out sections, a spring mounted on said hinge pin and pressing outwardly against said discs whereby to tend to cause said discs to rotate with said first mentioned elements, means limiting the rotation of said disc, whereby to prevent inadvertent interference by said discs with the locking action of said blocks.

4. A hinge of the character described comprising a pair of spaced parallel hinge elements constituting one wing of the hinge, a second pair of identical spaced hinge elements constituting the other wing of the hinge, both pairs of said elements having circular portions of the same diameter concentrically mounted on a common hinge pin, the circular portions of said first mentioned pair of elements positioned adjacent the inside

faces of the circular portions of said second mentioned pair of elements respectively, pairs of identical, transversely-aligned cut-out sections in the perimeters of the circular portions of said pairs of elements, a pair of transversely-extending locking blocks of wedge-shaped cross section mounted on the respective wings of said hinge in contact with the perimeters of said circular portions of said elements at diametrically opposite points and adapted for engagement with said pairs of cut-out sections respectively, said cut-out sections so located on the perimeters of the circular portions of said pairs of elements that said sections will be in registration with said locking blocks when said hinge is fully opened, a pair of coil springs connecting said locking blocks extending across said hinge past said hinge pin and exerting a force to pull said locking blocks inwardly towards said hinge pin, whereby when said hinge is fully opened said locking blocks will be automatically pulled by said springs into said pairs of cut-out sections respectively to lock said hinge in fully opened position, a pair of unlocking discs mounted on said hinge pin adjacent the inside faces of the circular portions respectively of said first mentioned pair of elements, each of said discs having peripheral cam edges adapted to engage said blocks when said discs are rotated in one direction whereby to move said blocks out of locking engagement with said cut-out sections, finger lugs on said discs to facilitate the manual rotation of said discs, a spring mounted on said hinge pin and pressing outwardly against said discs whereby to tend to cause said discs to rotate with said first mentioned elements, an engaging element on one of said blocks for engaging said finger lugs to limit the rotation of said discs in one direction, and means limiting the rotation of said discs in the opposite direction, whereby to prevent inadvertent interference by said discs with the locking action of said blocks.

5. In a hinge, a pair of spaced parallel hinge elements constituting one wing of the hinge, a second pair of similar spaced hinge elements constituting the other wing of the hinge, both pairs of said elements having circular portions concentrically mounted on a common hinge pin, the circular portions of said first mentioned pair of elements positioned adjacent the inside faces of the circular portions of said second mentioned pair of elements respectively, a pair of identical, transversely-aligned cut-out sections in the perimeters of the circular portions of said first mentioned pair of elements, a transversely-extending locking block of wedge-shaped cross section mounted on one wing of said hinge in contact with the perimeters of said circular portions of said first mentioned pair of elements and adapted for engagement with said pair of cut-out sections, said cut-out sections so located on the perimeters of the circular portions of said first mentioned pair of elements that said sections will be in registration with said locking block when said hinge is opened to a predetermined desired position, spring means connected with said locking block and constantly exerting a force to move said locking block inwardly towards said hinge pin, a pair of unlocking discs mounted on said hinge pin adjacent the inside faces of the circular portions respectively of said first mentioned pair of elements, each of said discs having a peripheral cam edge adapted to engage said block when said discs are rotated in one direction, whereby to move said block out

of locking engagement with said cut-out sections.

6. In a hinge of the character described, a pair of spaced parallel hinge elements constituting one wing of the hinge, a second pair of similar spaced hinge elements constituting the other wing of the hinge, both pairs of said elements having circular portions of the same diameter concentrically mounted on a common hinge pin, the circular portions of said first mentioned pair of elements positioned adjacent the inside faces of the circular portions of said second mentioned pair of elements respectively, pairs of identical, transversely-aligned cut-out sections in the perimeters of the circular portions of said pairs of elements, a pair of transversely-extending locking blocks of wedge-shaped cross section mounted on the respective wings of said hinge in contact with the perimeters of said circular portions of said elements and adapted for engagement with said pairs of cut-out sections respectively, said cut-out sections so located on the perimeters of the circular portions of said pairs of elements that said sections will be in registration with said locking blocks when said hinge is opened to a predetermined desired position, spring means

connected with said locking blocks and constantly exerting a force to move said locking blocks inwardly towards said hinge pin, a pair of unlocking discs mounted on said hinge pin adjacent the inside faces of the circular portions respectively of said first mentioned pair of elements, each of said discs having peripheral cam edges adapted to engage said blocks when said discs are rotated in one direction, whereby to move said blocks out of locking engagement with said cut-out sections, and finger lugs on said discs to facilitate the manual rotation of said discs.

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