This invention relates generally to hinges, and more specifically to an improved hinge structure pivotally securing the cover of a container housing to its receptacle. In the past, container housings constructed of plastic or molded material such as the cabinets of portable radios, jewel boxes, vanity cases and the like have been provided with a hinge structure including a spring member for pivotally securing the cover of the housing to the receptacle by some means other than the hinge. Although hinge structures of the type indicated have the advantage of being sufficiently rugged to provide good service, and also are relatively inexpensive to manufacture, one disadvantage thereof is that the spring member replacing the screws is comprised under tension when the hinge is in an assembled and operating position. The necessity of having the hinge in a tensioned condition at all times introduces tolerance and assembly problems as well as reducing the life of the spring member. The tolerances required of the spring member and the container housing are relatively critical and must be kept within defined limits. When assembling a hinge structure of this type, it is necessary to provide special equipment to tension the spring member so that it may be assembled in its operating position. These disadvantages of the container structure have been substantially eliminated by applicant's improved hinge structure in which the hinge structure is tensioned when the cover and receptacle are in an open position, and only become tensioned when the cover and receptacle are moved into a closed position. This improved hinge structure further has the advantage of overcoming the objectionable effects of slight case warpage and misalignment and reducing the tolerance requirements in the construction of the cover and receptacle of the container housing.

It is therefore an object of the present invention to provide an improved hinge structure for a container housing which is in an unmounted condition when the cover and receptacle of the container housing are in an open position, and in a tensioned position when the cover and receptacle are in a closed position.

Another object of this invention is to provide an improved hinge structure for a container housing that overcomes the objectionable effects of slight warpage and misalignment of the cover and receptacle.

One more object of this invention is the provision of an improved hinge structure that is of simple design and construction, efficient in operation, and economical to manufacture.

One more object of this invention is the provision of an improved spring hinge structure for pivotally securing a cover to a receptacle in which one of the members is provided with a cam engageable with the other member and adapted to progressively tension the hinge structure when the members are moved into a closed position, and to progressively tension the spring hinge when the members are moved from the closed position to an open position.

One additional object of this invention is the provision of a spring hinge member forming pivots for pivotally securing a cover to a receptacle in which the spring hinge member is provided with an offset portion to permit freedom of movement of the pivots without overstressing any of the hinge parts as the cover and receptacle are moved between closed and open positions.

Objects and advantages other than those set forth above will be obtained from the following description when read in connection with the accompanying drawing, in which:

FIG. 1 is a fragmentary exploded perspective view of a hinge structure constructed in accordance with a preferred embodiment of the present invention;

FIG. 2 is a fragmentary side elevation view partially in section showing the cover and receptacle in an open position with the spring member of the hinge structure in an unmounted position;

FIG. 3 is a view similar to FIG. 2 showing the cover and receptacle in a closed position with the spring member of the hinge structure in a tensioned position; and

FIG. 4 is a section view taken substantially along line 4--4 of FIG. 2.

As shown in the drawings, a segmental portion of a cover 5 of a container housing has a wall 4 provided with a pair of spaced apart, parallel ribs 6 integrally molded therewith and having pivot sockets 7 in the ends thereof to receive pivots 8 formed by the ends of a generally U-shaped spring 9. Although only one hinge is shown in the drawing, container housings of this type are normally provided with at least two of such hinges spaced apart from one another for pivotally securing wall 4 of cover 5 to a complimentary wall 12 of a receptacle 11.

A portion of receptacle wall 12 of the container housing is preferably molded to form a laterally extending recess 13 terminating along each side thereof into channels 14 formed by overhanging ribs 15 co-operating with the base of recess 13 as best seen in FIG. 4. The portion of wall 12 in register with recess 13 is provided with an elongated slot 16 and wall 12 of receptacle 11 is further provided with a cam 17 shown as a transversely extending rib as best seen in FIGS. 2 and 3 for a purpose to be explained hereinafter.

The spring 9, only one of which is shown, for pivotally securing cover 5 to receptacle 11, is constructed of some suitable wire possessing the required strength and resilience characteristics. The pivots 8 of spring 9 which lie along a common axis are formed by bending each end of spring 9 inwardly. The pivots 8 of spring 9 terminate in off-set portions 18 formed by bending the wire substantially at right angles to pivots 8. The offset portions 18 reduce the extent of movement of pivots 8 with respect to an abutment formed by edge 19 of slot 16 during movement of cover 5 and receptacle 11 between open and closed positions thereby greatly reducing the possibility of overextending spring 9 and permanently damaging it, and further permitting cover 5 and receptacle 11 to be opened further. The wire is bent sharply once again substantially at right angles to the offset portions 18 to form a pair of parallel, spaced-apart arms 21 terminating in a cross bar 22 connecting the two arms as seen in FIG. 1. The cross bar 22 is provided with a bent center portion 23 extending beyond a plane including arms 21 of spring 9.

In the assembly of this hinge structure, pivots 8 of spring 9 are initially bent apart laterally, placed in alignment with pivot sockets 7, and released whereupon pivots 8 are urged by the natural resilience of spring 9 into sockets 7 pivotally securing spring 9 to cover 5. The cover 5 is moved into an open position with respect to receptacle 11 and spring 9 is positioned in alignment with recess 13 of receptacle 11 and moved inwardly with arms 21 slidably entering channels 14. During the initial sliding move-
ment, bent portion 23 of cross bar 22 engages bed 13 causing cross bar 22 to be slightly bent convexly with the ends of cross bar 22 and the apex of center portion 23 lying in the same plane. The operator continues to move spring 9 inwardly until center portion 23 of cross bar 22 registers with and enters elongated slot 16 at which time cross bar 22 becomes unthreaded. The spring 9 which is unthreaded is now secured to both cover 5 and receptacle 11 which are in an open position, and may be moved longitudinally within limits determined by the sides of center portion 23 engaging edges 19, 24 of slot 16. The edge 19 forms a stop means for center portion 23 to prevent withdrawal of spring 9 from recess 13.

In the assembled position, spring 9 pivotally secures cover 5 to receptacle 11. In prior known types of hinge structures for container housings, the spring when assembled, constantly urges a portion of the wall of the cover into contact with a portion of the wall of the receptacle whether the cover and receptacle are open or closed. In addition, the pivot for the hinge structure is a fixed point with respect to any portion of the walls of the cover and receptacle. The novel feature residing in applicant's invention is in the provision of the above-mentioned cam 17 of receptacle 11 causing pivots 8 to move with respect to inner edge 19 of slot 16 as cover 5 and receptacle 11 are moved from the open position as seen in FIG. 2 to a closed position as seen in FIG. 3. When cover 5 and receptacle 11 are in the closed position, the distance between the center of pivot 8 and inner edge 19 of slot 16 is greater than this same distance when cover 5 and receptacle 11 are in the open position. Accordingly, in the open position, spring 9 is unthreaded, and edge 25 of wall 4 is not urged into engagement with the periphery of cam 17. Consequently, there will be a certain amount of lost motion or play between edge 25 of wall 4 and the periphery of cam 17 when the two are in an open position which is beneficial in that it compensates for warpage and misalignment between edges 23, 26 of walls 4, 12 respectively. As cover 5 and receptacle 11 are moved into the closed position, the periphery of cam 17 is so shaped as to engage edge 25 and cam wall 4 away from wall 12 causing pivot 8 to be shifted in a direction away from inner edge 19 of slot 16 thereby progressively tensioning spring 9.

The invention has been described in detail with particular reference to a preferred embodiment thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove and as defined in the appended claims. For example it will be understood that while I have referred herein and described a preferred embodiment involving a receptacle and cover, my inventive concept also includes use of the invention with other hinged members.

I claim:

1. In an improved hinge structure, the combination comprising: a receptacle member having a first wall; a cover member for said receptacle member having open and closed positions relative to the receptacle member, the cover member further having a second wall in register in a plane with the first wall when the cover member is in the closed position; a hinge rib having an opening therein and carried by one of said walls; means defining a channel in the other of said walls; a tension spring slidably and non-rotatably carried at one end thereof in the channel, said spring having a portion at the other end engaging the hinge rib opening, the said opening and spring portion defining a pivot about which the cover member and second wall move between the open and closed portions, said other wall further having an abutment for limiting the sliding movement of the spring and against which said one end of the spring is drawn during the movement to the closed position; a surface transverse to the said plane on one of said members; a cam on the other of said members having a periphery contacting said surface during the pivoted movement between the open and closed positions, said periphery having a first section engaging the surface at the closed position to tension the spring by increasing the distance between said pivot and the said one end of the spring, the said periphery further having a second section for engaging the surface at the open position wherein said distance is smaller and the spring is relaxed.

2. The combination according to claim 1 wherein the spring comprises a substantially U-shaped spring having its open side bent inwardly to form the portion engaging the hinge rib.

3. The combination according to claim 2, wherein the cross bar of the U-shaped spring has a projection, and the said other wall defines a slot for receiving the projection and one edge of the said slot forms said abutment.

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