March 20, 1934. J. S. HOFFMIRE 1,951,979

CLOTHES DRIER

Filed Dec. 21, 1932 2 Sheets-Sheet 1

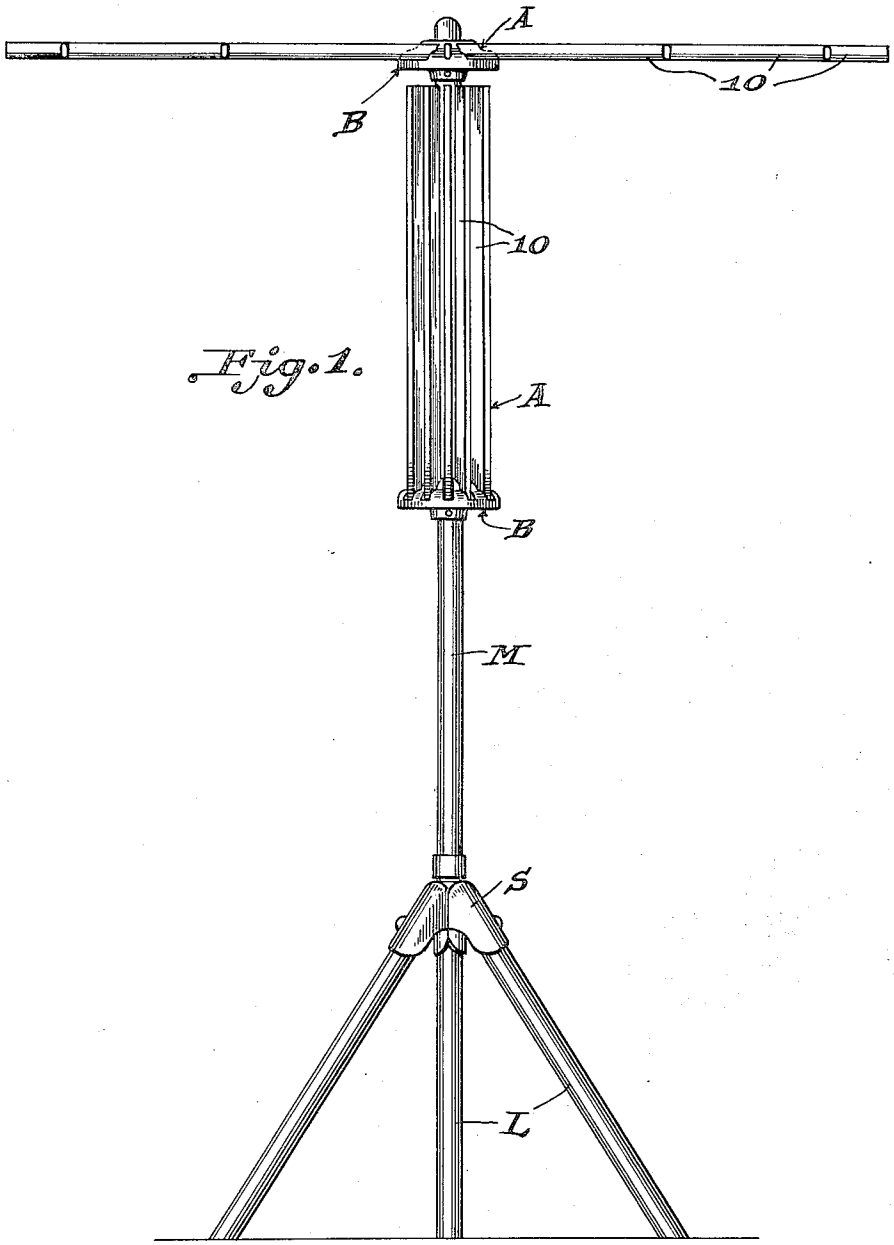


Fig. 1.

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Fig. 2.

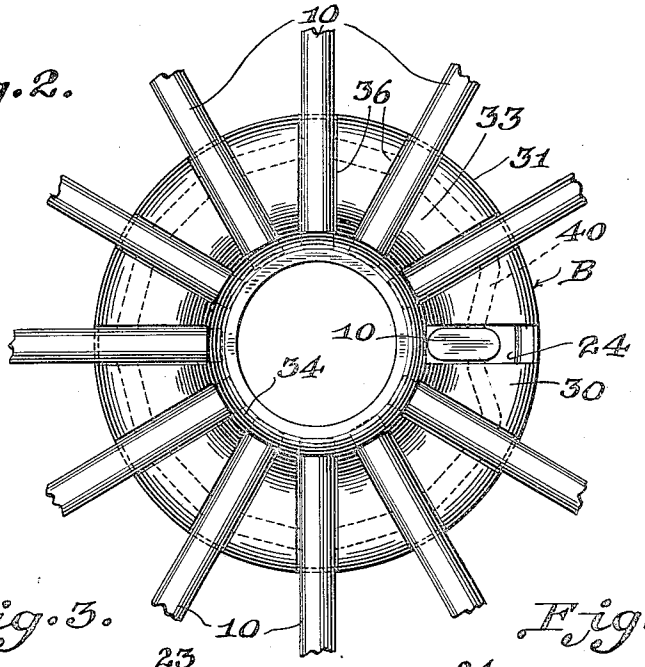


Fig. 3.

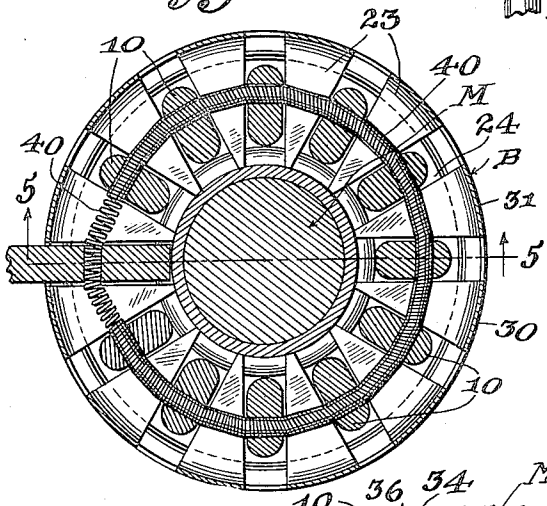
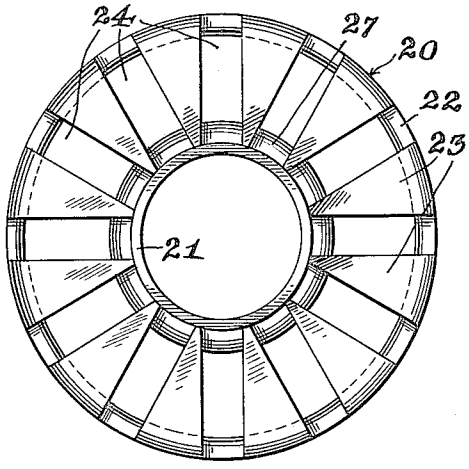


Fig. 4.



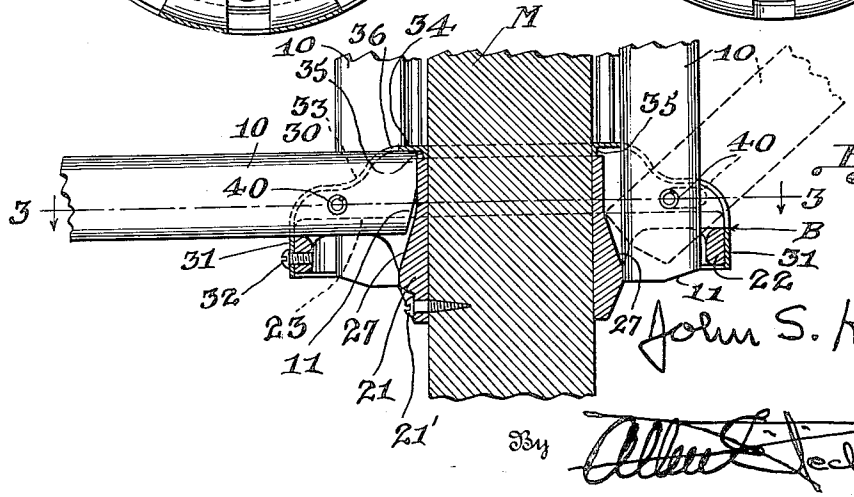


Fig. 5.

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UNITED STATES PATENT OFFICE

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CLOTHES DRIER

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13 Claims. (Cl. 211—171)

This invention relates to certain improvements in clothes driers and the like; and the nature and objects of the invention will be readily recognized by and apparent to those skilled in the art in the light of the following explanation and detailed description of the accompanying drawings illustrating what I now believe to be the preferred embodiment or mechanical expression of my invention from among various other forms, arrangements, combinations, and constructions of which the invention is capable within the spirit and the scope thereof.

The invention is primarily directed to that general class of collapsible or foldable driers which find a wide and universal use for household drying purposes; although the several features of the invention are in no sense essentially restricted or limited to application to and embodiment in driers for any particular purpose, but are adapted generally to driers, clothestrees and such like apparatus irrespective of the uses for which such apparatus may be designed or may be utilized.

Such class of driers in the portable household types are generally characterized by a vertical column or mast on which a cluster or group, or a plurality of such clusters or groups vertically spaced, is mounted with the arms spaced around the column and pivoted for vertical swinging from their outwardly swung operative horizontal and article receiving positions extending radially from and around the column, to their inoperative, collapsed or inwardly swung positions along, in close proximity to and substantially parallel with the column. This general type of portable drier presents certain problems and difficulties which it is an object of my present invention to overcome and substantially eliminate, by the provision of a mechanically simple, relatively inexpensive, but efficient design and arrangement of mounting for the swinging arms, capable of withstanding the conditions to which such driers are subjected in use.

The portable types of driers particularly, have the swinging arms thereof subjected not only to considerable operating strains due to the continual swinging of the arms in use to and from operative positions, but also subject the arms to considerable forces, especially in their outwardly swung operative positions, as the result of being struck by or striking against adjacent objects, and of pressures and forces applied thereto in placing articles on and removing the same from the extended arms. Space and price requirements imposed on such portable driers by the users, necessitate relatively light weight and minimum dimensional construction, so that, strength against breakage and displacement of the swinging arms on their mounting under the strains and stresses in use cannot readily practically be "built-in" by the use of expensive materials and constructions, or increased weight or size.

A further object of my invention is the provision of a mounting unit or base for a cluster or group of the swinging arms and a design of pivotal mounting for the arms on such a base, which will be of relatively inexpensive construction requiring a minimum of parts capable of easy and low cost assembly, and which will form a yielding and resilient mounting for the arms to afford a degree of shock absorbing "give" or play to minimize breakage or failure in the mounting under handling strains and stresses imposed on the arms in use, as well as providing for the application of forces or pressure on the arms tending to resist their inadvertent or gravity displacement from collapsed positions, and also tending to return the arms to inoperative positions when released from their outwardly extended operative positions.

Another object and feature of the invention is the provision of a pivotal mounting for a group of swinging drier arms by which a single pivot member is utilized for all the arms and which member may be formed of a resilient or elastic annulus or ring on and around which the arms are pivotally mounted; and further to provide a simple and efficient design of arm group or cluster supporting base unit which may be composed of but two major elements, and on which the arms are mounted for guided swinging on the pivot member which is positioned under tension on the base and yieldingly maintaining the arms in position for swinging thereon.

A further object and feature of the invention resides in the design of the arm group mounting and supporting base unit to form a guideway or cam track for engaging the end of each arm in swinging to and from collapsed inoperative position, with each arm held under the tension of the resilient annular arm pivot member; and further to so design the base unit that the arms in their outwardly extended operative positions are supported against downwardly acting forces solely by the base with the pivot annulus or ring member relieved from the imposition of any such strains or loads.

With the foregoing general objects and features in view, as well as certain other objects, features and results which will become clearly apparent

from the following description and explanation, the invention consists in certain novel features in construction and in combinations and arrangements of parts and elements, as will be more fully and particularly referred to and specified hereinafter.

Referring to the accompanying drawings in which similar reference characters refer to corresponding parts throughout the several figures thereof:

Fig. 1 is a view in elevation of a portable type of clothes drier, including arm groups or clusters embodying the several features of my invention; the arms of the upper group being shown in downwardly swung, extended operative position, and the arms of the lower group being shown in upwardly swung, folded inoperative position along and adjacent the drier mast or column.

Fig. 2 is a top plan view of an arm group mounting or hub unit, with one arm in raised, folded position and the remainder of the arms in downwardly swung, operative position.

Fig. 3 is a horizontal sectional view, taken as on the line 3—3 of Fig. 5, through an arm group mounting or hub unit and the arms mounted pivotally thereon, showing particularly the pivotal mounting and arrangement of the arms on the annular elastic or spring arm pivot forming member, one of the arms being shown in downwardly swung operative position.

Fig. 4 is a top plan view of the lower or base forming section of the mounting or hub unit for an arm cluster or group.

Fig. 5 is a vertical, transverse section through one of the arm groups or clusters and the mounting or hub unit thereof, taken as on the line 5—5, of Fig. 3.

I have selected and disclose herein purely by way of example, a clothes drier of the portable household type embodying and incorporating my invention, because the several features of and results and advantages attained by the invention are of particular utility and value in overcoming and reducing certain conditions and disadvantages encountered with and incident to such types of driers. I do not however intend or desire by the disclosed example of drier, to restrict or confine the invention to such types or to the specific forms taken by the invention in meeting the requirements for the type, as the invention is of wide utility and adaptation for other types and arrangements of driers or equivalent devices calling for the utilization of swinging arms or holders of the general character of the drier arms and their mounting herein exemplified.

A portable household type of clothes drier incorporating the invention is disclosed in Fig. 1 of the drawings, as including a mast, column or vertical standard M, preferably rotatably mounted and supported at its lower end in a suitable socket forming base member of holder S carried by and mounted on the converged upper ends of a supporting leg structure L, which in this instance happens to be of the tripod type. At suitably spaced intervals vertically of the mast M, groups or clusters A of drier arms 10 are suitably mounted with the arms 10 of each group A spaced around the mast and each arm vertically swingable. The arms 10 of each group A are downwardly swingable from their inoperative folded position disposed along, adjacent to and around mast M, as shown by the lower group A of Fig. 1, to horizontally disposed operative position extending outwardly and radially from and around the mast, as shown by the upper group A in Fig. 1. While the drier in the instant example includes but two arm groups A, obviously this is not intended in any sense as limitation, as a single or any desired number of groups can and are intended to be utilized if desired to meet the requirements of any particular drier.

As mechanically expressed by the particular example hereof, each arm cluster or group A includes the mast carried mounting base or hub unit B on which the arms 10 are vertically swingably mounted and confined in positions spaced around the mast M. Such base or hub unit is, in this instance, composed of a lower or base member 20 and an upper or cap member 30 fitted thereon in position arched upwardly thereover. (See Fig. 5 in particular.)

The lower or base member 20 of a hub unit B, in the present example, is circular in form or outline and formed of a casting, stamping or the like of any suitable material. The central portion of this base member 20 is formed to provide a collar or hub 21 having an axial bore therethrough for receiving and fitting over and through which the mast M extends with the base mounted and secured in position on the mast. Any suitable means may be employed for securing base 20 to mast M, such for instance as screws 21′ extended through the collar into the mast (see Fig. 5). The outer peripheral portion or rim 22 of base 20 is concentric with but spaced outwardly from hub 21, and is connected with such hub by a series of spaced, radially disposed segments or substantially triangular portions 23 having their inner end apexes connected with and joined to sleeve or hub 21, and extending radially outwardly from and around hub 21 to, and having their outer end bases connected to and joined with the upper edge of rim 22. The segments 23 are disposed and lie in a plane above the plane of rim 22, and are so arranged and spaced apart around hub 21 that they provide the series of spaced arm receiving slots 24 therebetween, extending radially from and around the central hub portion 21, between such hub and rim 22, as will be clear by reference to Figs. 4 and 5 of the drawings in particular.

The upper member or cap 30 of the hub units B, is, as in the example here shown, preferably formed of a suitable metal, or other adapted material, stamping which is circular in form and has its depending annular skirt or wall 31 of an internal diameter to fit over and around the outer side of the rim 22 of base member 20. Any suitable or desired fastening means, such as the screws, bolts, or the like 32, are provided for removably mounting cap 30 in position on and over base 20 (see Fig. 5). The outer side wall 31 of cap 30 extends upwardly a distance above base 20 and joins the top wall 33 which extends inwardly over and across base 20 and is formed with a raised central or neck portion 34, referring now to Fig. 5 of the drawings. The raised central portion 34 of cap 30 is formed with a central or axial mast receiving opening therethrough in vertical, axial alinement with the bore through base sleeve portion or hub 21, and this opening is formed with a depending flange 35 therearound which may, if desired, seat on the upper end of base sleeve 21 when the cap is in assembled position on base 20, but which primarily serves to strengthen and add rigidity to the cap structure.

The cap 30, so formed, is provided with a series of radially disposed arm receiving slots 36 thereabout and extending radially outwardly from raised central portion 34 and downwardly through

the cap wall 31, preferably although not essentially, to points slightly below the upper edge of base member rib 21, when the cap is in mounted position. In mounted position of the cap 30 on base member 20, the cap slots 36 are vertically alined with and lie directly above the slots 24, respectively, formed in the base 20 between segments 23.

Now, in accordance with a further important feature of my invention, the arms 10 for each mounting or hub unit B, formed as described above, are vertically swingably mounted in and extending upwardly through the alined pairs, respectively, of base and cap slots 24 and 36, by an annular or ring member of elastic or resilient character, such as provided by the coil spring 40 of the instant example. The coil spring 40 is disposed around base 20 between cap 30 and the base, and extends through a transverse bore in each arm 10, the ends of the coil spring 40 being connected together with the spring preferably under tension when the arms are in normal vertically disposed inoperative position. Thus, the spring 40 connects the arms and forms a pivotal mounting on which the arms are vertically swingable in their respective slots.

The relative position of spring 40 and arms 10 thereon, with respect to the central sleeve or hub 21 of base 20, is such that, when an arm is swung downwardly from upwardly extended, folded position, the lower end of the arm swings inwardly and upwardly against hub 21. In order to assist and control such movement and force the arm outwardly a distance to expand the portion of spring 40 on which the downwardly swinging arm is mounted to thereby increase the spring tension on the arm, the sleeve or hub 21 is formed with a vertically disposed, downwardly and outwardly inclined cam groove or track 27 for the end of each arm 10. (See Fig. 5.) The lower end of each arm at the outer under edge 11 thereof is upwardly and outwardly inclined, so that when an arm 10 is swung downwardly the inner end edge engages and slides upwardly on cam groove 27 to move the arm bodily outwardly a slight distance, until the arm is in operative horizontally extended position with its inner end abutted against the upper end of groove 27 and the inclined portion 11 fitted over the lower outwardly inclined portion 11 of the groove, as clearly shown by Fig. 5.

In horizontally disposed, operative position, each arm 10 is engaged and supported on the rim 22 of base 20 between segments 23 against downwardly acting loads, while the inner end also engages under cap portion 34. In this manner the spring 40 is relieved of the imposition thereon of such loads in operative positions of the arms, while the spring 40 exerts tension holding the arms in abutment with their respective grooves 27, against inadvertent upward displacement.

The arms 10 are swingable upwardly from operative extended position, and once swung upwardly past what may be termed their "dead center" horizontally disposed position, the expanded spring 40 then acts thereon to return them to their folded, inoperative position disposed upwardly along and adjacent mast M. In their folded position the spring 40 tends to maintain them against inadvertent or gravity displacement, while in addition the spring affords a yielding elastic mounting having certain shock absorbing qualities in the handling and swinging of the arms which materially reduces breakage and failure in arm mountings.

The design and arrangement of each arm group or cluster with the mounting base or hub unit B, is of extreme mechanical and structural simplicity, embodying as it does but three major elements in addition to arms 10, namely, base member 20, cap 30, and spring 40, all of which major elements are of relatively low cost manufacture. The assembly is materially simplified by the presence of but the single member, the spring 40, for swingably mounting all of the drier arms of a group.

While a coil spring is here shown as providing the yielding, tension exerting mounting for an arm or arms swingable thereon, it is to be clearly understood that any equivalent form or character of resilient, yielding or elastic member is contemplated by and included within the invention. Similarly, the invention includes a mounting and arrangement for the swinging arms, such that, instead of the endless form of spring or its equivalent, such member may be curved or arcuate or disposed in a straight line with its ends suitably secured to other structure, as the equivalent of the annular form with the ends of the spring connected to each other, as in the illustrated example hereof.

It is also evident that various other modifications, variations, substitutions, additions, and eliminations might be resorted to without departing from the spirit and scope of my invention, and hence I do not desire to limit myself in all respects to the exact and specific disclosures hereof.

Desiring to protect my invention in the broadest manner legally possible, what I claim, is:

1. In a drier or the like, a plurality of vertically swingable arms spaced around a vertical axis, a mounting structure providing a plurality of spaced radially disposed slots within which said arms are swingably disposed, respectively, an annular coil spring extending transversely through the lower ends of said arms and on which the arms are swingably mounted, said spring normally under tension to exert a force tending to maintain the arms in vertical position, means engaged by the inner end of each arm when the arm is swung to horizontal position to force the arm outwardly to further expand said spring, and said mounting structure providing seats to receive and on which the arms engage in horizontal position to prevent transmission of downwardly acting loads on an arm to said spring.

2. In combination, a mounting structure, an elastic and yielding pivot member on said structure, an arm swingably mounted on said elastic pivot member and normally maintained in folded position by the tension exerted thereon by said member, the pivoted end of said arm engaged with said mounting structure to force the arm outwardly and expand the pivot member when the arm is swung from folded to extended operative position.

3. In combination, a mounting structure, an elastic and yielding pivot member on said structure, an arm vertically swingably mounted on said elastic pivot member and normally maintained in vertically disposed position by the force exerted thereon by said member, the inner end of said arm engaged by said mounting structure to force the arm outwardly against said elastic member when the arm is swung to horizontally disposed extended position.

4. In combination, a mounting structure, an elastic and yielding pivot member on said structure, an arm vertically swingably mounted on said

elastic pivot member and normally vertically disposed on said structure, the supporting structure providing a surface engaged by the inner end of said arm to force the arm outwardly against the tension of said elastic pivot when the arm is swung outwardly to extended position, and said structure providing seats at opposite sides of the pivot member on which the arm engages and is supported in outwardly swung position on said structure, the inner end of the arm maintained against said structure by the elastic pivot member with the arm in extended position.

5. In combination, a mounting structure, an elastic and yielding pivot member on said structure, an arm vertically swingably mounted on said elastic pivot member and normally maintained in vertically disposed position by the force exerted thereon by the member, said structure providing an inclined surface engaged by the inner end of the arm to force the arm outwardly against the tension of said yielding elastic pivot when the arm is swung outwardly to horizontally disposed position, and a seat formed by the structure against which the inner end of the arm abuts and is maintained by the elastic pivot member with the arm in horizontal position.

6. In a drier or the like, a mounting structure including a hub portion and a plurality of spaced radially disposed slots extending therefrom and therearound, a plurality of vertically swingable arms having their lower ends disposed in said slots, respectively, an annular coil spring disposed on said mounting structure around the hub portion and transversely across said slots, said spring extending transversely through the lower ends of said arms with the arms vertically swingable on the spring as an axis and the spring under tension to maintain the arms in vertically disposed folded position extending upwardly from the mounting structure, the mounting structure providing a cam surface for and engaged by the lower end of each arm when swung downwardly to further expand the spring and hold the lower end of the arm firmly abutting the cam surface in lowered position of the arm, and a seat on the mounting structure on which each arm rests in lowered position thereof.

7. In a drier and the like, in combination, a mounting structure providing a slot therein, a drier arm having its inner end disposed in said slot, a coil spring on the mounting structure disposed across said slot and extending transversely through said arm to provide a pivot on which the arm is swingable, the mounting structure formed with a surface at the inner end of the slot engaged by the end of the arm when the arm is swung to lowered position to force the arm outwardly and place the spring under increased tension for maintaining the arm in lowered position against accidental displacement, and a seat provided by the mounting structure on which the arm is supported in lowered position.

8. In a drier or the like, a mounting structure including a base member having a central hub portion and a series of slots through the member spaced radially around and from the central hub portion, an annular elastic member extending around the base member across said slots, a plurality of arms on the base member with their inner ends disposed in said slots, respectively, and said elastic member extending transversely through the arms to provide a pivot on which the arms are swingable, said arms in folded position disposed substantially parallel to the axis of the mounting member and maintained against accidental swinging by the tension exerted by said elastic pivot member, a cover member secured over said base member and elastic pivot member to maintain the pivot and arms against displacement, said cover member formed with radial slots therein through which the arms swingably extend, respectively, the central hub portion of the base member provided with surfaces engaged by the inner ends, respectively, of the arms when the arms are swung outwardly to unfolded position to force each arm outwardly against the force of said elastic pivot member, the base member providing seats for supporting the arms, respectively, in outwardly swung position, and the cap member providing a stop engaged by the inner ends of the arms to limit outward swinging thereof.

9. In a drier or the like, including a plurality of vertically swingable arms, a mounting structure providing a plurality of slots in which the arms are respectively disposed for independent vertical swinging, a coil spring extending transversely through and on which the arms are mounted and maintained for vertical swinging to and from normal vertically disposed folded position, said arms each swingable on said coil spring to horizontally disposed unfolded position, said coil spring under tension with the arms in folded vertical position to exert forces on the arms tending to maintain the same against swinging, and means for forcing each arm outwardly against the tension of said spring when the arm is swung to horizontally disposed unfolded position.

10. In a drier or the like, including a plurality of vertically swingable arms, a mounting structure providing a plurality of slots in which the arms are respectively disposed for individual vertical swinging, a coil spring on the mounting structure extending across said slots and transversely through the ends of said arms in the slots with the arms carried by and swingable on said spring as an axis, and means forcing each arm outwardly as the arm is swung to horizontally disposed unfolded position against the tension of and expanding of the spring to exert a force tending to maintain the arm in its horizontal position.

11. In a drier or the like, a plurality of vertically swingable arms spaced around a vertical axis, a mounting structure providing a plurality of spaced radially disposed slots within which the inner ends of said arms are disposed respectively, an endless elastic member extending around said mounting member across said slots and secured to the member between the slots, said endless elastic member extended transversely through the arm ends in the slots with the arms carried thereby and individually vertically swingable thereon as an axis, and means engaged by the inner end of each arm to force the arm outwardly against the tension of and expanding the elastic member when the arm is swung to horizontally disposed unfolded position, said elastic member exerting a force maintaining a horizontally disposed arm in engagement with said means against displacement.

12. In a drier or the like, in combination, a plurality of vertically swingable arms, a coil spring extending transversely through the ends of said arms with the arms carried thereby and pivotally mounted for swinging thereon as an axis said spring normally under tension with and holding the arms in normal folded vertically disposed position, and means engaged by each arm to force the arm outwardly against the tension of and expanding said spring to hold the arm in normally unfolded horizontally disposed position.

13. In a drier or the like, in combination, a mounting providing a slot therein, a coil spring extending across the slot and secured at opposite sides thereof to the mounting, an arm disposed in said slot and pivotally and swingably mounted on and carried by said spring as a mounting, and means engaged by the inner end of said arm when the arm is swung to horizontal position to force the arm outwardly and expand said spring, said expanded spring exerting a force to maintain the inner end of the arm in engagement with said means with the arm in horizonal position.

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