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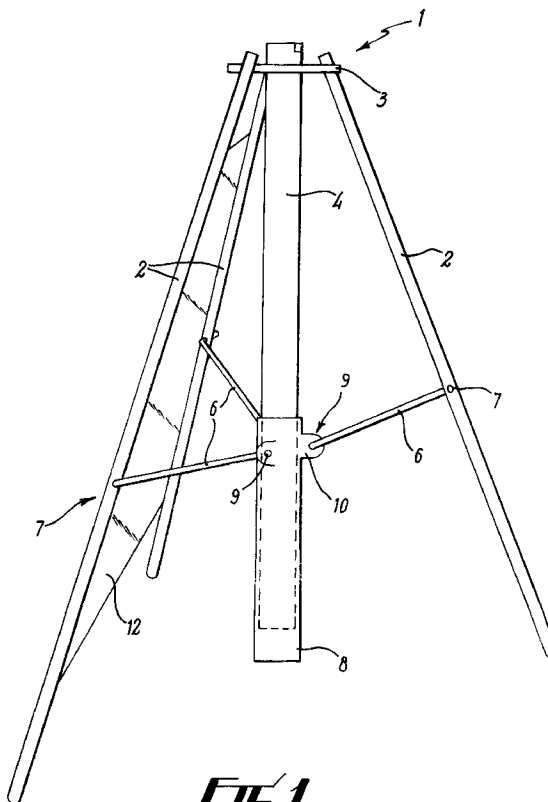
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(54) **Support.**

(57) A support (1) comprises one or more support legs (2) pivotally connected to a first member (4) and one or more link members (6), each link member being pivotally connected adjacent one end (7) thereof to a support leg and adjacent the other end (9) thereof to a second member (8). The first member (4) is slidably located within the second member (8) so that the support legs (2) are movable between a first position in which the legs (2) extend from the first member (4) and the support can rest on the ground in a supporting disposition and a second position in which the legs (2) are disposed adjacent the first member (4). Movement of the legs (2) from the first to the second position is obtained by lifting the support from the ground. Movement of the legs from the second position to the first position is obtained by moving the second member (8) relative to the first member (4) towards the pivotal connections (3) of the legs (2) with the first member (4).



The present invention relates to a support and in particular to a collapsible support suitable for supporting a sign or other device. The invention has particular application in the field of road signs, traffic control barriers and the like.

Collapsible supports for road signs are known. For example, EP0113596 discloses an apparatus for use as a traffic warning device comprising a central tube having a fixed lower hinge block to which link arms are pivotally connected. A number of support legs are pivotally connected at one end to the other end of the link arms. The other ends of the support legs are pivotally connected to an upper hinge block which is slidably supported on the central tube. In use, the support legs are moved into the open and closed position by sliding the upper hinge block down or up the central tube causing the lower end of the legs to move out from or in towards the central tube as the link arms pivot on the lower hinge block.

Similar sliding collar constructions are known for various tripod stands such as are used on projector screens, music stands and the like.

However such known stands suffer from a number of drawbacks. In particular with these conventional support stands, one generally has to hold the sliding collar and often also the central tube to effect opening or closing of the stand. Usually such stands require a catch or the like to prevent the collar sliding when in the open position. Alternatively the collar can be made a close fit on the central tube so that it won't slide without an applied force. However both of these methods increase the difficulty of opening or closing the stand. These disadvantages can cause particular problems for temporary road signs and the like which usually have to be erected as speedily and easily as possible. Furthermore, with these conventional types of support stand, the weight to be supported must generally be applied to the central tube the base of which is supported on the ground. Thus the support legs do not carry the bulk of the weight and merely act as stabilisers. If the bulk weight were to be applied to the support legs and collar, the catch or collar would tend to give so that the collar would tend to slide on the central tube thereby causing the support legs to spread or open too far thus reducing the effect of the support. Similarly applying the bulk weight to the legs and collar would increase the strain placed on the legs and collar. A further disadvantage of stands such as that disclosed in EPO 113596 is that when in the open position the central tube must extend beyond the level of the upper hinge block so that, when closing the stand the upper block can slide upwardly on the central tube. This means that the stand is not as compact as might be desired and the extended tube makes the stand more unstable in the open position. This can be a particular problem for road signs and the like which need to have maximum wind resistance.

GB 961401 discloses a road safety sign having support legs pivotally connected at one end to a central guide tube. Link arms are pivotally connected to the support legs and to a sleeve mounted on the guide tube. A spring mounted between the sleeve and the top of the guide tube causes the sign to be biased towards the open position. In order to close the sign, the legs are pivoted towards the guide rod so that the sleeve slides up the tube against the pressure of the spring. GB 2274478 discloses a road sign of similar construction where instead of having a spring to bias the sign into the open position the sliding collar comprises a weight which has the same effect. Again closing is effected by pivoting the legs towards the central tube against the gravitational effect of the weight. Both of these devices, although easier to open, are not any easier to close than that shown in EP 0113596 and require two hands for closure.

Also a stop or other means must be provided on the end of the central tube to prevent the sleeve from sliding off the end.

WO90/11408 discloses an arrangement similar to that of GB 2274478 where a weighted sleeve is slidably mounted on a central tube. The weight biases the stand towards the open position. This document describes a means of simplified closing of the stand by having a wire connected to the weight by means of which the weight can be slid along the central tube thereby pivoting the legs into the closed position. However this arrangement suffers from similar disadvantages in that the wire must be pulled against the gravitational effect of the weight and two hands would be required to effect closing. Furthermore in order to store the sign vertically in the closed position the sign must be suspended from the pulled up wire. Also an abutment is required to prevent the weight sliding off the end of the central tube. A further disadvantage is that the weight can cause a violent jerk on the sign attached to the support when opening.

Again with each of the latter three prior art arrangements, if too much weight is applied to the support legs the sleeve can come free of the lower end of the central tube so that the legs spread or open too far and the sign becomes unstable.

The present invention has been made in order to provide a collapsible support which overcomes one or more of the above mentioned disadvantages.

One object of the invention is to provide a collapsible support which can easily and conveniently be both opened and closed, preferably by a single handed operation. Thus the stand of the invention will have particular applicability to the temporary erection of road signs and the like.

Preferably the invention provides a support which can be opened and closed simply by pushing down on or lifting up the top region of the support so that there is no need to locate a collar, to directly pivot the legs or to pull a wire in order to open or close the stand.

A further preferred object of the invention is to provide a support which does not require a catch or other additional means to maintain the stand in the open or closed position.

A still further preferred object of the invention is to provide a stand which can support any weight applied to it without causing the support legs to spread.

A further object of the invention is to provide a more compact and stable support.

Preferably the support of the invention is such that an extension beyond the length of the support legs is not required so that the support is more compact and wind resistant.

According to the invention there is provided a support comprising one or more support legs pivotally connected to a first member and one or more link members, each link member being pivotally connected adjacent one end thereof to a support leg and adjacent the other end thereof to a second member characterised in that said first member is slidably located within said second member so that the support legs are movable between a first position in which the legs extend from the first member and the support can rest on the ground in a supporting disposition and a second position in which the legs are disposed adjacent the first member, movement of the legs from the first position to the second position being obtained by lifting the support from the ground and movement of the legs from the second position to the first position being obtained by moving the second member relative to the first member towards the pivotal connections of the legs with the first member.

Preferably the relative movement of the first and second members from the second to the first position is obtained by applying a downward force to the first member. Preferably the movement of the legs from the first to the second position is obtained by applying an upward force to any of the support legs, the first member or the pivotal connection between said legs and first member.

Preferably when the support is in the second position the pivotal connections between the link members and the support legs are disposed substantially between the pivotal connections between the link members and the second member and the pivotal connections between the support legs and the first member.

Preferably when the support is in the first position or any position between the first and second positions a line taken perpendicularly from the first or second member to the pivotal connections between the link members and the support legs intersects the axis of the first and second members at a location between the pivotal connections of the link members with the second member and the pivotal connections of the support legs with the first member. Part of the first member may extend partially or wholly within the second member.

Preferably the support can be moved between the first and second positions and vice-versa by a single-handed operation. The second member may act as a guide for the first member and the first member may be adapted to locate a device to be supported. A sign or other device may be supported on one or more of the support legs and/or on the first member. The support may be provided with one or more extension means extending from the support legs and/or from the first member to facilitate support of a sign or other device to be supported.

Preferably three or four support legs are provided. One or both of the first and second members and/or one or more of the support legs may comprise hollow tubes and such tubes may incorporate or be adapted to receive ballast weight. The support legs may be pivotally connected to the first member by a hinge means secured to or formed as an integral part of the first member. Ballast weights or other foot means may be releasably or otherwise secured to the free ends of one or more of the support legs. Such foot means may be adapted to locate in the ground or other surface on which the support is to be used.

The invention will now be described further by way of example only and with reference to the accompanying drawings in which:-

Fig. 1 is a side view of a support of the invention in the open position;

Fig. 2 is a front view of the support of Figure 1 in a semi-closed position;

Fig. 3 is a plan view of the hinge plate of Figure 1;

Fig. 4 is a front view of a warning light for use with the support of the invention;

Figs 5(a) and (b) show possible charging circuits; Fig. 6 is a rear view of a sign suitable for use with a support of the invention;

Fig. 7(a) is a side view of a further embodiment of the support of the invention;

Fig. 7(b) is a front view of a sign suitable for use with the support shown in Fig. 7(a);

Fig. 8(a) is a side view of an alternative embodiment of support of the invention;

Fig. 8(b) is a front view of a sign suitable for use with the support of Figure 8(a);

Fig. 9 shows a side view of a foot member suitable for use with a support of the invention; and

Fig. 10 is a plan view of an embodiment of link arm suitable for use in the support of the invention.

Referring to Figure 1, a support 1 of the invention comprises three support legs 2 each of which is pivotally attached at one end thereof to one end of a first member 4 by means of a hinge plate 3. Three link arms 6 are each pivotally attached at one end to a corresponding support leg 2 at pivot points 7 and at the other end to a second member 8 at pivot points 9. The end of the first member 4 remote from the hinge plate

3 is slidably located within the second member 8. Flanges 10 may be provided on the second member 8 to accommodate the pivots 9. Preferably the flanges are apertured and the ends of the link arms 6 located within such apertures. One or both ends of the link arms 6 may be angled as shown in Figure 10 so as to form the pivots 7 and 9 when located in the flange apertures and apertures located on the support legs 2. In use, when the support is in the open position, the second member 8 and the support legs 2 rest on the ground or other surface and the first member is suspended from the hinge plate 3, which is supported by the support legs 2.

In order to close the support, the support is lifted by means of hinge plate 3, first member 4 or any of the support legs 2. This has the effect of simultaneously lifting each of these members. The first member 4 therefore slides upwardly within the second member 8 while the legs 2 pull the link arms 6 upward at pivot point 7 so that they simultaneously pivot about pivot points 7 and 9.

Referring to Figure 2, the support then assumes the closed or semi-closed position as the legs 2 pivot on the hinge plate 3 to become substantially parallel with the first and second members 4,8. It will be appreciated that the support can be closed whether or note the second member 8 remains on the ground. Once the support is closed it will remain closed while placed in any orientation until the second member is placed on the ground. Then as soon as the support is let go the first member will slide downwardly within the second member thereby causing the legs to open out until they rest on the ground. A flexible sign 12 may be mounted between any two or more of the support legs 2 and this will flex and open or close as the support is opened or closed.

Referring to Figure 3, the hinge plate 3 comprises a substantially circular plate having a recessed portion 14 and corresponding pivot pin 16 therein for each support leg 2. The upper end of each support leg 2 has an aperture through which the pivot pin 16 is located. A circular aperture provided in the centre of the plate receives the first member 4. The first member 4 has a slot 18 provided in the top portion thereof for receiving a lamp or the like as shown in Figure 4. Clearly this slot is optional. The hinge plate 3 may be fixed to the first member 4 by adhesive or any other suitable means or the plate 3 and member 4 may be formed as an integral piece. Similarly the pivot pins may be fixed to the plate 3 or formed integral therewith. Alternatively any other suitable form of pivot arrangement may be used.

The warning light of Figure 4 comprises a key portion 20 on a flange member 22 located beneath the lamp rechargeable battery holder 24. The light is inserted into the top of the first member 4 of the support 1 and the key 20 is located by the corresponding slot 18. The flashing lamp portion 26 of the light is oper-

ated by an on/off switch 28 and is recharged through a snap connector 30 or the like which may be powered from the normal charging system of the vehicle. It will be appreciated that any suitable device may be mounted on the support whether directly on the hinge plate or on the top of the first member 4 or at any other suitable location. Such devices may include warning lights or signs, traffic lights, radar equipment or the like.

Alternatively or additionally any suitable sign or device may be mounted directly or indirectly on one or more of the support legs 2. Figure 1 illustrates the basic construction of a support of the invention. However it will be appreciated that various additional features or elements may be added to or included in the support particularly to facilitate mounting or support of a sign or other device as mentioned above. Some specific variations are described below by way of example only.

Referring to the circuit of Figures 5(a) and 5(b), the boxed area 32 represents the normal charging system of a vehicle. A connection is made in the line from the alternator to the solenoid and goes to an isolating switch 33, to a diode 34, to a resistor 35 (typically 6v) and finally to a rechargeable battery connection block 36 (typically 6v). The circuit is earthed at 37 on the vehicle body. If two 6 volt batteries are to be charged then the battery recharge block leads are coupled in series as shown in Figure 5(b) and the resistor 35 is removed.

The support of the invention may have a flexible sign 12 attached to two or more of the support legs and may have one or more signs attached between any pair of legs. It will be appreciated that although the support of the invention is described as a tripod arrangement, any suitable number of support legs may be used, for example four support legs. Similarly, in one embodiment the first and second members 4,8 may effectively form one of the support legs and in such an arrangement the support may be stable with only two further support legs. A combined double support arrangement, each support having a single support leg and an effective first and second member support leg may also be feasible with a sign or other member spanning the two supports to form a wedge shaped support. The support may not have a sign affixed to any of the legs but may be used for example as a tripod or quadruped to support a device or sign affixed to the top of the support. The signs used with the support need not be flexible. In particular, as shown in Figure 6 rigid plates 38 provided with channel section members 39 on their rear surface may be used wherein the channel members 39 releasably engage with two of the support legs. The channel members 39 will be disposed on the rear plate surface in such an orientation and position as to correspond with the support legs in the open position. The channel members may be flexible to assist location on the

support legs or may be rigid for sliding onto the legs. Clearly any other suitable form of clip arrangement or the like may be used. When a sign as shown in Figure 6 is used with the support of the invention, particularly the tripod or quadruped embodiment, it prevents the support legs from closing until the sign has been removed.

The support of the invention particularly in the tripod or quadruped embodiment, when used with a flexible unsupported sign material will generally carry a substantially triangular shaped sign. Any shaped or sized sign can be used when clip on arrangements are used on rigid signs. In order to enable a non-triangular flexible sign to be used, secondary folding, non-folding or pivoting arms or other attachment or extension means may be attached to or formed as part of the support, preferably attached to one or more of the support legs at appropriate heights. One such embodiment is shown in Figure 7(a) with a corresponding flexible sign 40 as shown in Figure 7(b). One or more cross members 42 are pivotally or otherwise attached to the hinge plate 3 or to the upper region of one or more of the support legs 2. One or more upright members 44 are pivotally or otherwise attached adjacent one end thereof to a corresponding cross member 42 and adjacent the other end thereof to the remote end of a corresponding support leg 2. When the support is in the open or erect position, the members 42 and 44 can be pivoted to the positions shown in Figure 7(a) so that a flexible sign 40, mounted between upright members 44 by means of sewn or otherwise channels 46 engaging the members 44, is displayed.

An alternative embodiment as shown in Figure 8(a) comprises extension arms 48 pivotally attached adjacent the upper region of support legs 2. These extension arms may be of over centre locking design which are locked or secured in the open position, as shown, by attaching a sign 50 which may be flexible. The sign 50 is attached at each corner thereof by means of any suitable mechanism 52 such as apertures, clips, bolts or the like to corresponding pins, clips, bolts or the like 54 provided on the arms 48 and on the support legs 2. It will be appreciated that any shape or size of sign whether flexible rigid or otherwise may thus be attached to or mounted on the support of the invention at any suitable number of locations by the provision of extension arms or members at any suitable location on the support. The support may be manufactured from any suitable material such as plastic, metal, wood, composite or the like. When the support is manufactured from tubing, in particular from light weight materials such as thin walled thermoplastic tubing or the like, the tubes employed in the construction may be fitted with end caps, stops or plugs inserted or formed at any convenient location in the tube so that the spaces between the caps or plugs may be filled with sand or any other suitable bal-

last medium. Variable ballast weights can be used according to the situation in which the support is to be used. The support of the invention may have barrier strips or barrier members attached thereto or may be used to support barrier planking or the like, whether or not simultaneously supporting, a sign or device as described above. The support may be stored in a rack system or the like for ease of transportation and/or storage. The support of the invention is suitable for automated erection and/or removal due to the ease of opening and closing the support.

Rigid sign plates and the like provided for use with the support may be constructed so that they are provided with hinges such that the sign plate may be folded up to reduce storage space. Any channel section members or clips attached to the sign back may be arranged appropriately. In order to provide a lower centre of gravity than can be achieved by constructing the support from substantially uniform cross-sectional tubing or other sectional members, or by ballasting them by totally filling the tubes, the tubes may be selectively ballasted by either filling only a lower portion of the legs and/or by attaching external ballast weights to the lower portion of the legs. Such a ballast weight 56 is shown in Figure 9 and may take the form of moulded hollow cylindrical ballast tubes 58 such as those made from recycled plastics. These may be pushed over the end of the legs 2 of the support and if desired may be shaped so that they project outwards to provide a greater footprint 60 than can be achieved by extending the legs 2 alone. In the example shown in Figure 9, the ballast weights become feet and may, if desired, be provided with projections 62 to point locate to the ground reference surface to provide greater resistance to movement.

Signs used with the support of the invention may be fully, partially or non retro-reflective. Thus, with the support of the invention the support legs are opened automatically when downward pressure is applied to the first members and then close automatically when the support is lifted off the ground. The top of the first member may be adapted to securely hold a warning light, company logo or other device. Any such device may for example be provided with a locating key and flange member which fits into a slot formed in the first member as shown in Figure 4. The locating key may be turned through 60° for example to give equal viewing of the device to two or more sides of the support and this is particularly useful when a sign is also supported on or between the support legs.

The support of the invention is self-erecting, can be used effectively on uneven ground and is of simple construction. The support has application in any number of fields such as janitorial works, airports, stations and the like.

Typically the second member bears no weight and is provided solely to facilitate sliding of the first

member therein to open and close the support legs. The first member may extend to the ground or other surface when the support is in the open position and may thus act as an effective extra central support leg.

Thus, the support of the invention can be erected or collapsed by one hand very quickly and when collapsed, stays collapsed despite its orientation during transport or storage. When erected it is very stable as it requires a lifting motion to collapse it. The weight requirement of the support can be easily adjusted by sliding weights into the central tubing or support legs or otherwise. With the support of the invention it does not matter how much weight is applied to the support legs, they will not spread.

It will be appreciated that the present invention is not intended to be restricted to the details of the above embodiments which are described by way of example only.

## Claims

1. A support (1) comprising one or more support legs (2) pivotally connected (3) to a first member (4) and one or more link members (6), each link member being pivotally connected adjacent one end (7) thereof to a support leg and adjacent the other end (9) thereof to a second member (8) characterised in that said first member (4) is slidably located within said second member (8) so that the support legs (2) are movable between a first position in which the legs (2) extend from the first member (4) and the support can rest on the ground in a supporting disposition and a second position in which the legs (2) are disposed adjacent the first member (4), movement of the legs (2) from the first position to the second position being obtained by lifting the support from the ground and movement of the legs from the second position to the first position being obtained by moving the second member (8) relative to the first member (4) towards the pivotal connections (3) of the legs (2) with the first member (4).

2. A support as claimed in claim 1 wherein relative movement of the first and second members from the second to the first position is obtained by applying a downward force to the first member.

3. A support as claimed in any preceding claim wherein movement of the legs from the first to the second position is obtained by applying an upward force to any of the support legs, the first member or the pivotal connection between said legs and first member.

4. A support as claimed in any preceding claim wherein when the support is in the second posi-

tion the pivotal connections between the link members and the support legs are disposed substantially between the pivotal connections between the link members and the second member and the pivotal connections between the support legs and the first member.

5. A support as claimed in any preceding claim wherein when the support is in the first position or any position between the first and second positions a line taken perpendicularly from the first or second member to the pivotal connections between the link members and the support legs intersects the axis of the first and second members at a location between the pivotal connections of the link members with the second member and the pivotal connections of the support legs with the first member.

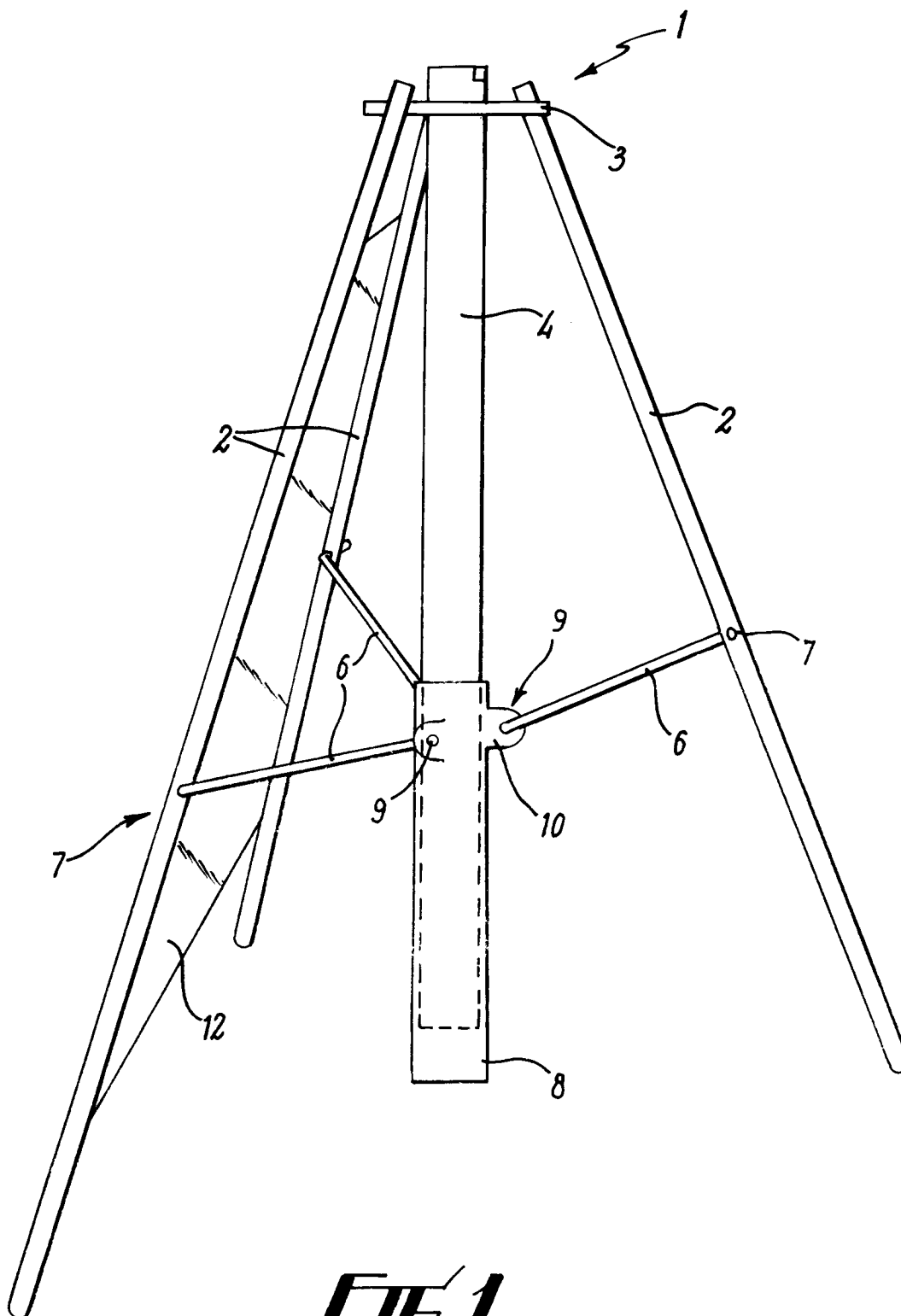
6. A support as claimed in any preceding claim wherein part of the first member extends partially or wholly within the second member.

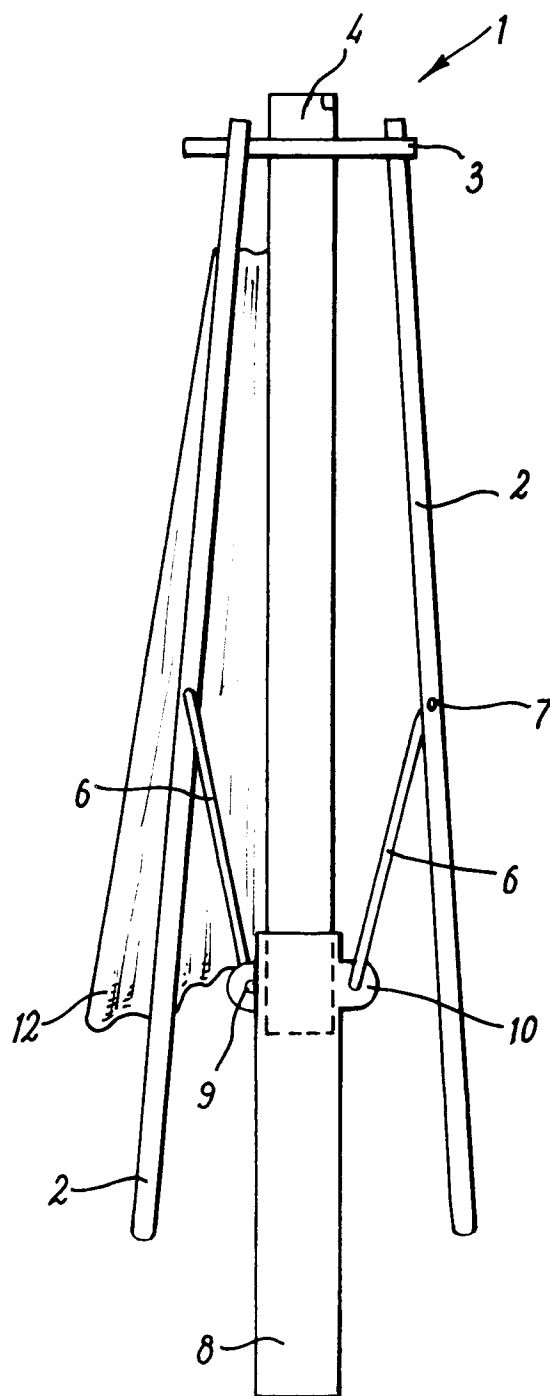
7. A support as claimed in any preceding claim wherein the second member acts as a guide for the first member.

8. A support as claimed in any preceding claim wherein one or more extension means (42,44,48) is provided on the support to facilitate support of a sign or other device.

9. A support as claimed in any preceding claim wherein the support legs are pivotally connected to the first member by a hinge means (3) secured to or formed as an integral part of the first member.

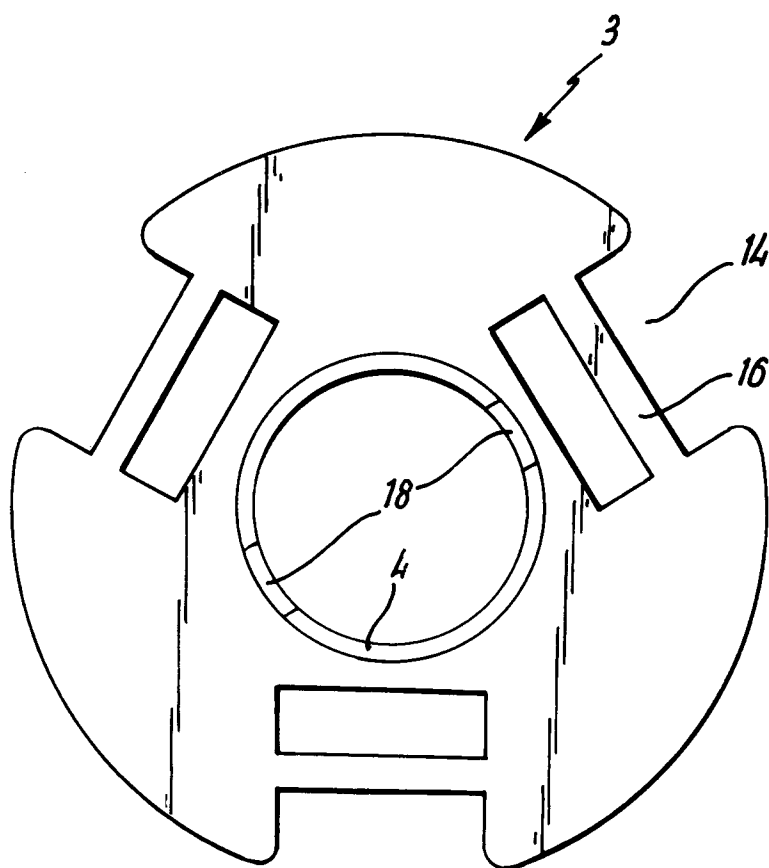
10. A support as claimed in any preceding claim wherein ballast weights are located on or within one or more of the support legs, the first member or the second member.



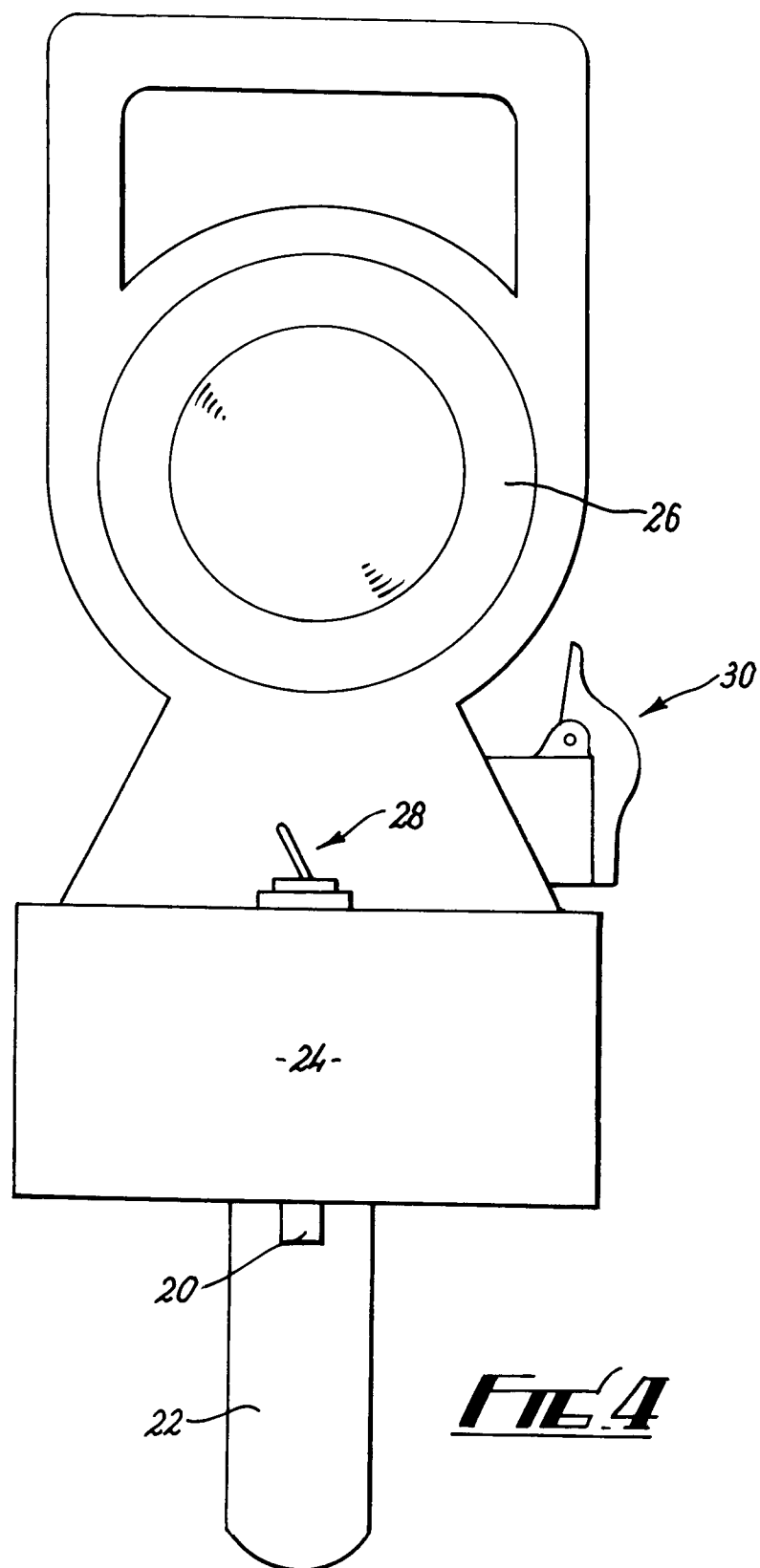


**FIG. 2**





**FIG. 3**



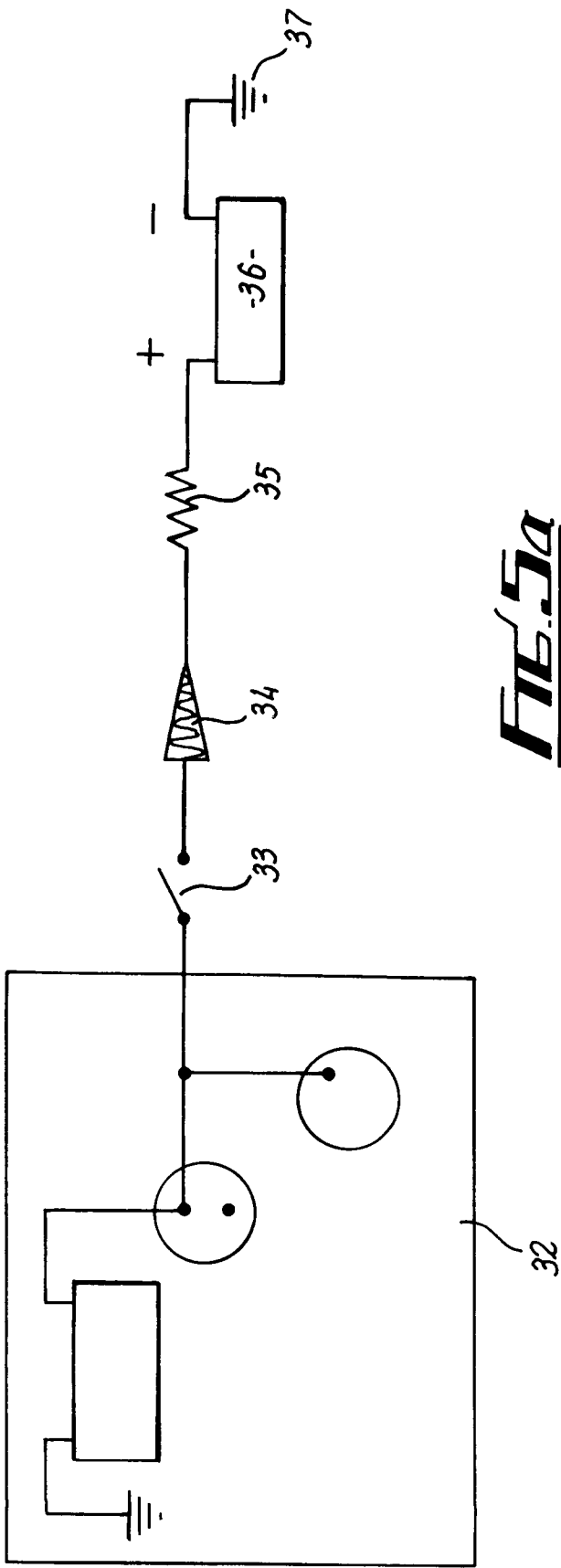


FIG. 5a

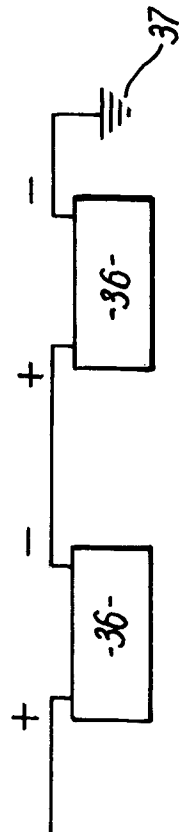
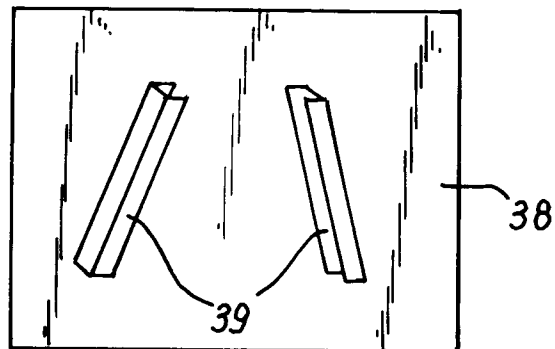
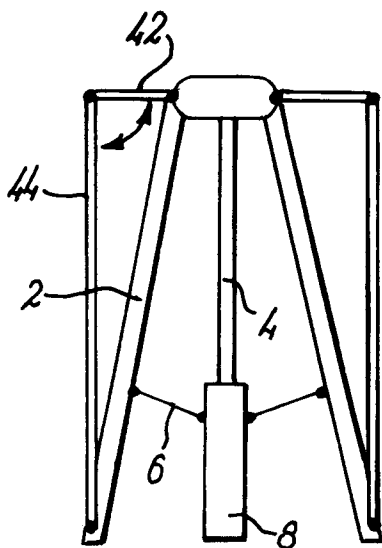


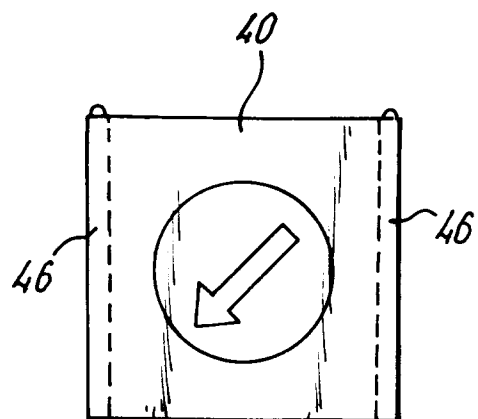
FIG. 5b



**FIG. 6**

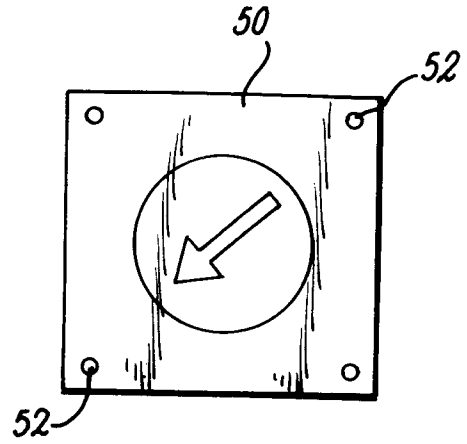
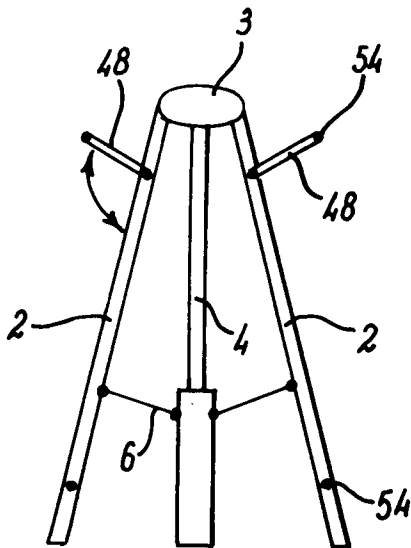


**FIG. 7a**



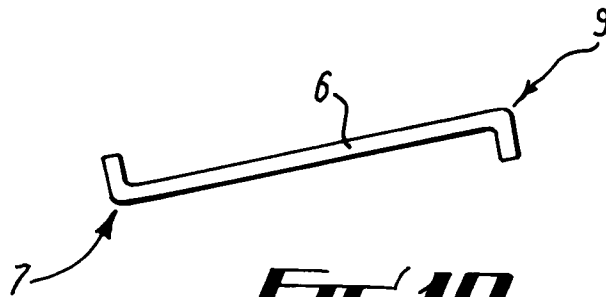
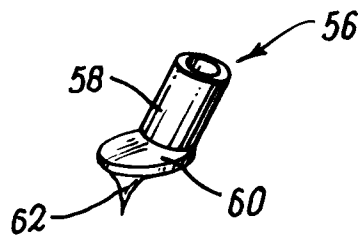
**FIG. 7b**

**Fig. 8a**



**Fig. 8b**

**Fig. 9**



**Fig. 10**