

FOLDING FRAMEWORK AND SUPPORT LEGS**BACKGROUND OF THE INVENTION****1. Field of the Invention**

5 The present invention relates to a folding framework, and in particular to a folding framework for support legs that fold toward one another.

2. Description of the Prior Art

10 Folding frameworks are widely known in the art and are used for many applications such as for folding stages, tables, platforms, and other applications which require a deck or planar member to be supported. The frameworks provide an elevated supported surface and
15 provide for folding to a storage position wherein the device requires less storage space. Although prior folding linkages have provided for folding to a narrower profile for the stage or other device, still further improvements are possible.

20 It can be appreciated that it is preferable to have the entire linkage mount against the underside of a deck and to fold to a substantially flattened position nesting within a framework for the deck. It can further be appreciated that it is preferable to have two sets of
25 legs folding towards one another to provide a more stable support system when the legs are in the extended use position near the edges of the decking, while still folding to a flat storage position.

 It can be appreciated that in addition to
30 stages, tables and other platforms, ramps also need support, and it is preferable to have a folding support framework which may be folded against the underside of the ramp. However, the angle of the deck relative to the legs adds special problems and makes it more difficult to adapt
35 to a folding linkage. In addition, the legs require different lengths between the opposed ends of the ramp, complicating the configuration of a folding linkage.

 Such a folding framework should provide a folding linkage which is simple and provides easy and

dependable operation. The linkage should also use standard elements which may be easily and cheaply manufactured.

It can be seen then that a device is needed
5 which provides a folding framework for a supported structure with sets of support legs that fold toward one another. It can also be appreciated that such a device should provide for folding to a storage position with the legs and linkage members lying substantially flat against
10 the underside of the supported surface. The linkage should also provide sturdy support for the legs and provide for supporting angled deck surfaces. The present invention addresses these as well as other problems associated with folding frameworks.

15

SUMMARY OF THE INVENTION

The present invention is directed to a folding framework for a deck or other supported structure. The folding framework connects to a stationary framework and
20 includes legs extending downward from the framework. The supported surface may be angled, thereby requiring a first set of legs having a first height and a second set of legs having a different height. The folding framework includes extendable braces extending between the sets of legs with
25 members slidably telescoping relative to one another. The members are lockable with a spring-loaded pin or other device to lock the folding framework in the stored or use positions. The telescoping members include angled end portions and extending downward from the extensible
30 members and pivotally connecting to legs. This configuration provides for offsetting the legs above the telescoping members when in the folded storage position.

The sets of legs fold inward and the extendable braces shorten when in the folded storage position. In
35 the storage position, the framework for the legs is folded substantially flat against the underside of the supported deck. The legs mount to the deck and stationary framework

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED

on a mounting member. The legs include a stop which is angled to locate the leg in the use position, to support the deck at the proper inclined angle.

These and various other advantages and features of novelty which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by its use, reference should be made to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, wherein like reference letters and numerals indicate corresponding elements throughout the several views:

Figure 1 shows a perspective view of a ramp apparatus including ramp sections have leg support structures according to the principles of the present invention;

Figure 2 shows a perspective view of a ramp section for the ramp shown in Figure 1 having a folding framework according to the principles of the present invention;

Figure 3 shows a side elevational view of the ramp section and folding framework shown in Figure 2, with the frame in an unfolded use position;

Figure 4 shows a perspective view of the underside of the ramp section shown in Figure 2 with the frame in a partially folded position;

Figure 5 shows a perspective view of the underside of the ramp section shown in Figure 2 with the frame in a fully folded position for storage;

Figure 6 shows a perspective view of the connection of a leg for the folding framework; and,

Figure 7 shows a side elevational view of the connection for a leg for the folding framework.

5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Referring now to the drawings, and in particular to Figure 1, there is shown a ramp, generally designated 10. The ramp 10 includes several ramp sections 12 of increasing heights to form a ramping surface from the ground to an elevated level. The ramp 10 is configured to attach to an elevated stage or platform to provide a gradual sloping surface.

As shown more clearly in Figure 2, each of the ramp sections 12 includes a deck 14 having a stationary framework 16. The framework 16 is configured for attaching the ramp sections 12 together to form a continuous surface and for attaching to a platform or elevated stage. Below the deck framework 16 of each of the higher sections 12 is a folding framework 18, including support legs 20. The legs 20 are two different lengths to accommodate the incline of the ramp section 12 and each pair of legs 20 includes cross members 22 extending therebetween. In addition, two extensible braces 24 extend between the two sets of legs 20. It can be appreciated that for the ramp to angle, the legs 20 must have two different lengths with the framework 18 capable of folding the different length sets of legs 20. However, it can be appreciated that the present invention may also use a folding framework 18 which may be utilized with non-ramping surfaces. Moreover, although in the embodiment shown, the ramp 10 extends upward at an angle α of approximately five degrees, lesser or greater angles may also be utilized.

Referring now to Figures 3-5, as shown in Figure 3, in the unfolded position, the extensible braces 24 include telescoping members 26 and 28 sliding relative to one another. In the embodiment shown, the telescoping

members 26 and 28 are locked into place by spring-loaded pins 34 extending through aligned orifices in the telescoping members 26 and 28. The spring-loaded pins 34 include a handle 36 for releasing and inserting the
5 retainer pin 34. In addition, to facilitate folding, at each end of the telescoping members 26 and 28 are angled portions 32. The angled portions extend downward from the ends of the telescoping members 26 and 28 and attach to a pivot pin 30 on the legs 20. The angled portions 32
10 provide for better folding and storage of the framework 18, as explained hereinafter.

Referring now to Figure 4, to fold the framework 18 to a storage position, the retainer pins 34 must be released so that the telescoping members 26 and 28 may
15 slide freely relative to one another. When this has been done, one of the sets of legs 20 may be folded inward, thereby decreasing the overall length of the extensible braces 24. After one set of legs 20 has been folded inward, the second set may also be folded inward as shown
20 in Figure 5. It can be appreciated that in this position, the lowermost portion of the legs 20 overlies the extensible braces 24. The angled portions 32 offset the legs 20 from the extensible members 24 for better folding and storage. To unfold the framework 18, one set of the
25 legs 20 is pulled outward away from the deck 14. The other set of legs 20 is then extended, thereby sliding the telescoping members 26 and 28 outward. The retaining pins 34 align with the orifices in the telescoping members 26 and 28 when fully extended to maintain the framework 18 in
30 the use position shown in Figure 3.

Referring now to Figures 6 and 7, the legs 20 connect to the deck 14 and deck framework 16 at mounting members 40. A pivot pin 44 extends through the leg 20 and receiving portions 42 on the mounting member 40 to provide
35 for rotation of the leg 20 and thereby folding of the framework 18. An angled stop 46 mounted on the leg 20 provides for positioning the leg 20 at an angle of α plus

90 degrees relative to the mounting member 40 to maintain the angled deck 14 in the proper position relative to the legs 20. In this manner, the legs 20 remain in a vertical position while the deck is fully supported at its angled position. The stop 46 also limits the rotation to prevent overrotating the legs 20 while allowing the legs 20 to fold inward toward one another.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

WHAT IS CLAIMED IS:

1. A folding support apparatus, for supporting a deck or the like, comprising:

a first pair of folding legs and a second pair of folding legs, wherein the first and second pairs fold toward the other pair;

extensible braces extending between corresponding legs of the two pairs, including an angled end portion, extending downward from ends of the braces and pivotally mounting to the legs; and,

stop means associated with each of the folding legs, for limiting the folding motion in an unfolded position.

2. A folding support apparatus according to claim 1, wherein the support apparatus includes upper mounting members, and wherein the internal angle between the mounting members and the first pair of legs is greater than 90 degrees and the internal angle between the mounting members and the second pair of legs is less than 90 degrees.

3. A folding support apparatus according to claim 1, wherein the stop means comprises a member extending from the leg near an upper end of the legs.

4. A folding apparatus according to claim 1, wherein the extensible braces fold substantially flat against the underside of the deck in a fold position.

5. A folding apparatus according to claim 4, wherein the legs fold over the extensible braces in the folded position and raised by the angled end portions.

6. A folding support apparatus, comprising:
a supported surface having an underside;
a folding leg, pivoting between an extended position



THIS SHEET HAS BEEN
REPLACED



and a retracted position, wherein the legs lie substantially flat against the underside of the supported surface in the retracted position;

an extensible brace having a first end attached to the leg and extending in the same direction as the leg folds.

7. A folding support apparatus according to claim 6, further comprising an angled portion extending from the first end of the telescoping brace and extending downward from a longitudinal axis of the brace at an angle of less than 90 degrees.

8. A folding support apparatus according to claim 6, further comprising stop means associated with the folding leg, limiting the folding motion in an unfolded position.



* C L M S *

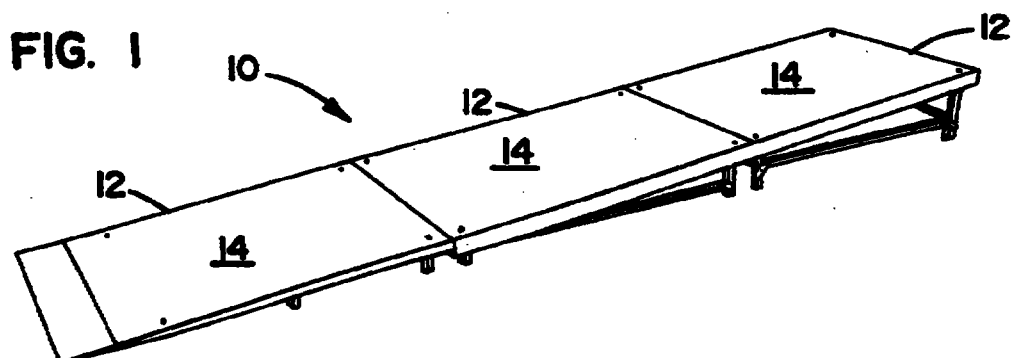


FIG. 2

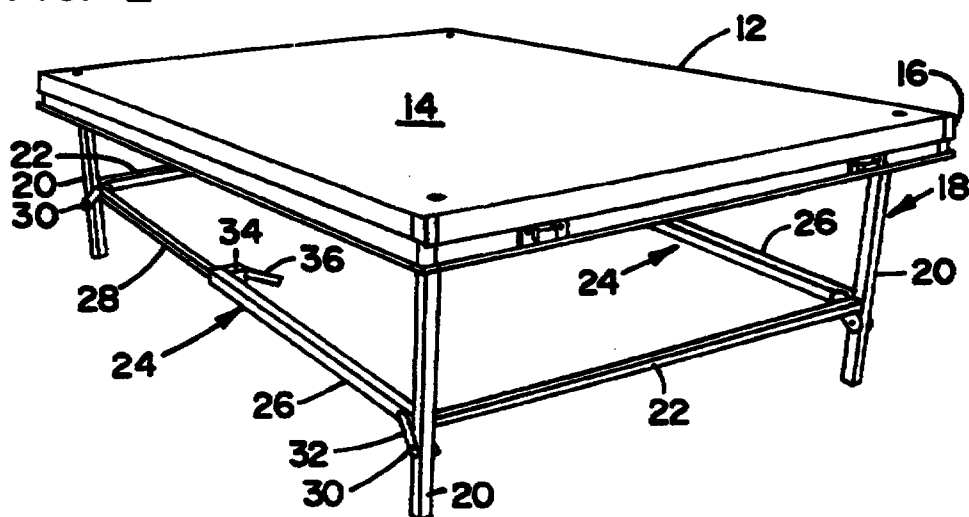
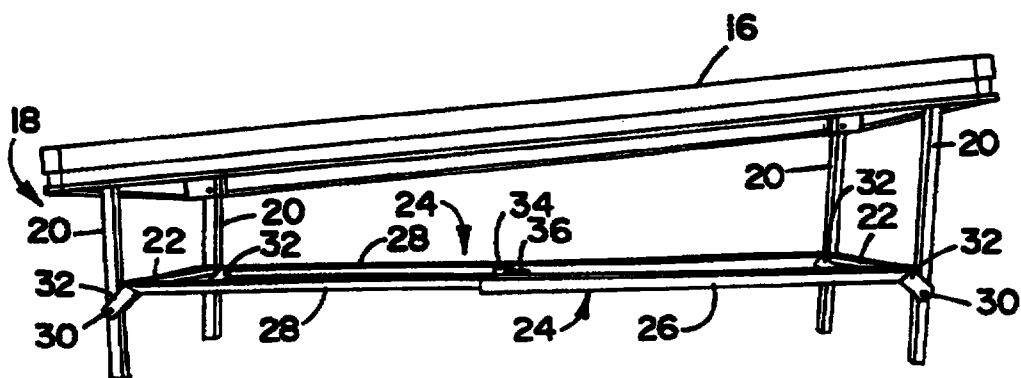


FIG. 3



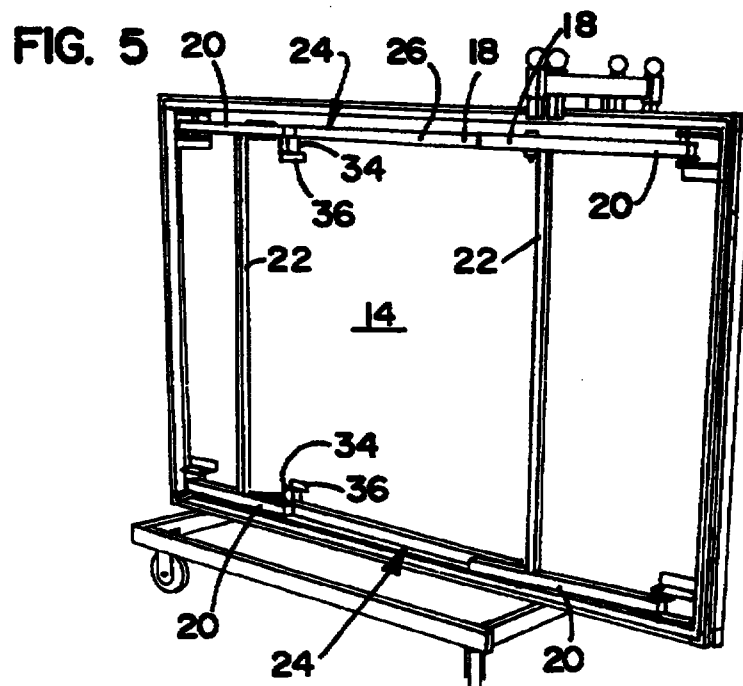
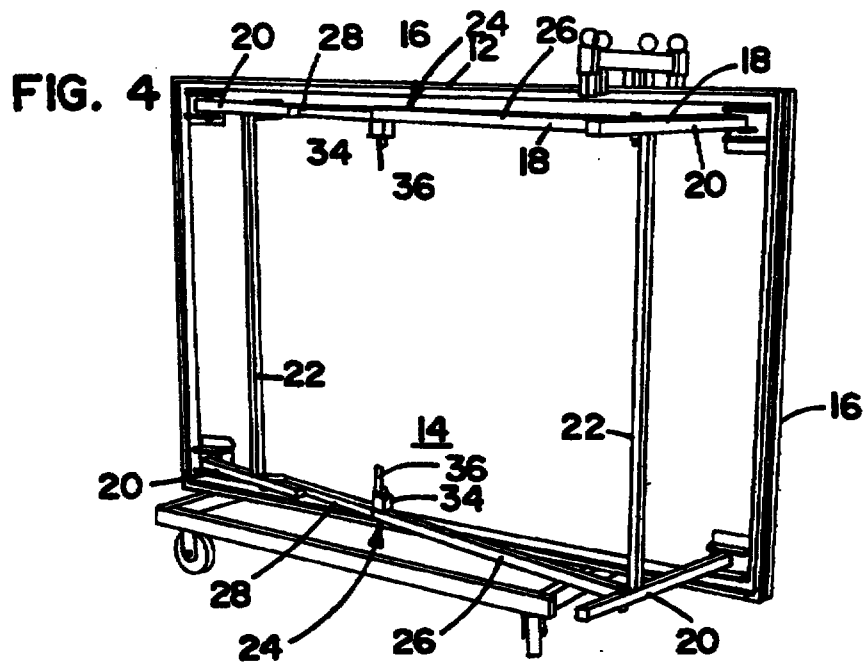


FIG. 6

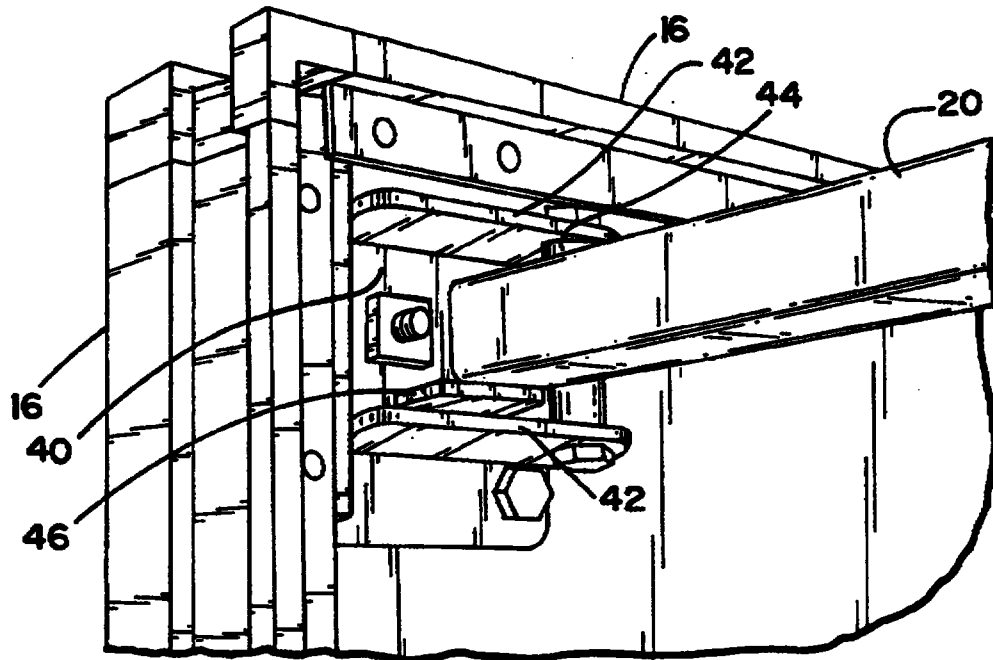
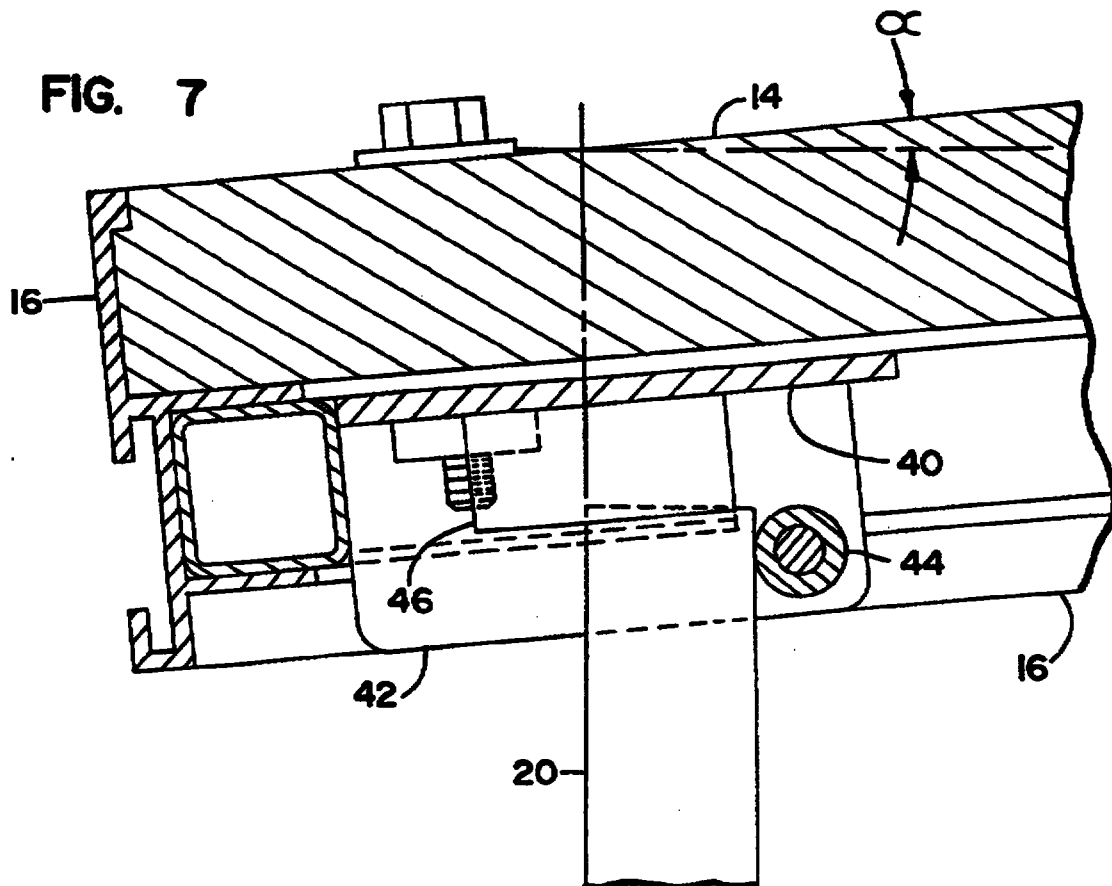


FIG. 7



PCT

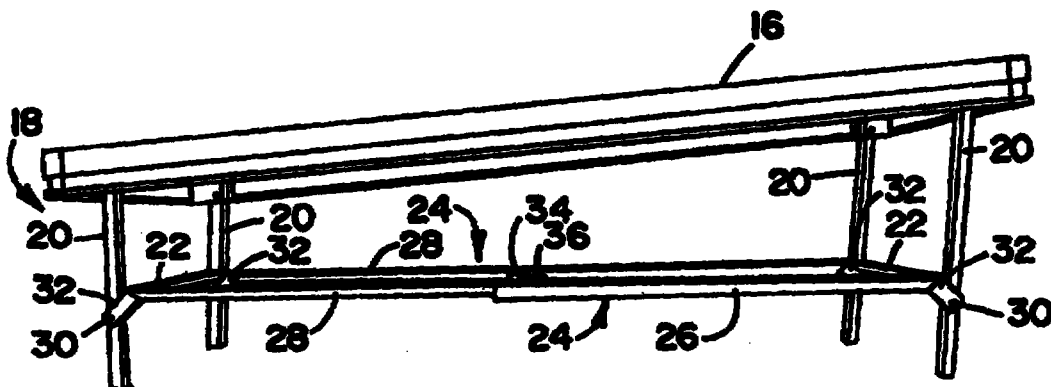
WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : E04H 3/28, A47B 3/08	A1	(11) International Publication Number: WO 96/26339 (43) International Publication Date: 29 August 1996 (29.08.96)
(21) International Application Number: PCT/US96/02674 (22) International Filing Date: 23 February 1996 (23.02.96) (30) Priority Data: 08/396,195 24 February 1995 (24.02.95) US (71) Applicant: SICO INCORPORATED [US/US]; 7525 Cahill Road, P.O. Box 1169, Minneapolis, MN 55440 (US). (72) Inventors: BOTTS, Rollin, D.; 4617 Oxboro Lane, Bloomington, MN 55437 (US). SHANK, Donald, A.; 19923 Darrell Lane, Rogers, MN 55374 (US). (74) Agent: BRUESS, Steven, C.; Merchant, Gould, Smith, Edell, Welter & Schmidt, P.A., 3100 Norwest Center, 90 South Seventh Street, Minneapolis, MN 55402-4131 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>With amended claims.</i> Date of publication of the amended claims: 10 October 1996 (10.10.96)

(54) Title: **FOLDING FRAMEWORK AND SUPPORT LEGS**



(57) Abstract

A folding framework (18) for a ramp section (12) includes folding legs (20). The legs include extendable members (24) extending between the sets of legs with an inner sliding member (28) and an outer sliding member (26) providing for folding motion. The sets of legs (20) both fold inward to a storage position wherein extendable members (24) and the legs (20) lie substantially flat against the underside of a supportive deck (14). The extendable members (24) include an angled end portion (32) which extend downward and pivotally mount to the legs (20) for offsetting the extendable members (24) from the legs (20) when in the folded position.

AMENDED CLAIMS

[received by the International Bureau on 26 August 1996 (26.08.96);
original claims 6-8 cancelled; original claims 1 and 3-5 amended;
new claims 6-9 added; remaining claim 2 unchanged (2 pages)]

1. A folding support apparatus, for supporting a deck or the like, comprising:

a first pair of folding legs and a second pair of folding legs, wherein the first and second pairs fold toward the other pair;

stop means associated with each of the folding legs, for limiting the folding motion in an unfolded position; and,

characterized by extensible braces extending between corresponding legs of the two pairs, including an angled end portion at each end of the braces, extending downward from each end of the braces and pivotally mounting to the legs.

2. A folding support apparatus according to claim 1, wherein the support apparatus includes upper mounting members, and wherein the internal angle between the mounting members and the first pair of legs is greater than 90 degrees and the internal angle between the mounting members and the second pair of legs is less than 90 degrees.

3. A folding support apparatus according to claim 1, wherein the stop means comprises a stop member mounting to and extending from each of the legs near an upper end of the legs and engaging mounting members.

4. A folding support apparatus according to claim 1, wherein the extensible braces fold substantially flat against the underside of the deck in a folded position.

5. A folding support apparatus according to claim 4, wherein the legs fold over the extensible braces in the folded position and are offset from the deck by the angled end portions.

6. A folding support apparatus according to claim 1, wherein the extensible braces comprise telescoping members.

7. A folding support apparatus according to claim 3, wherein the stop member mounts to the leg and is configured to offset the leg by an angle greater than zero and less than 90 degrees from a direction perpendicular to the deck.

8. A folding support apparatus according to claim 3, wherein the stop member mounts to the leg at an oblique angle to a longitudinal direction of the leg.

9. A folding support apparatus according to claim 1, wherein the angled end portion extends at an oblique angle to a longitudinal direction of each of the extensible braces.

This Sheet Has Been Replaced



dependable operation. The linkage should also use standard elements which may be easily and cheaply
5 manufactured.

German patent DE-U-8428611 discloses a table having pairs of folding legs which fold toward one another with a cross member associated with each set of legs. Extendible braces extend between the legs and provide a
10 pivoting connection.

It can be seen then that a device is needed which provides a folding framework for a supported structure with sets of support legs that fold toward one another. It can also be appreciated that such a device
15 should provide for folding to a storage position with the legs and linkage members lying substantially flat against the underside of the supported surface. The linkage should also provide sturdy support for the legs and provide for supporting angled deck surfaces. The present
20 invention addresses these as well as other problems associated with folding frameworks.

SUMMARY OF THE INVENTION

The present invention is directed to a folding
25 framework for a deck or other supported structure. The folding framework connects to a stationary framework and includes legs extending downward from the framework. The supported surface may be angled, thereby requiring a first set of legs having a first height and a second set of legs
30 having a different height. The folding framework includes extendable braces extending between the sets of legs with members slidably telescoping relative to one another. The members are lockable with a spring-loaded pin or other device to lock the folding framework in the stored or use
35 positions. The telescoping members include angled end portions and extending downward from the extensible members and pivotally connecting to legs. This

configuration provides for offsetting the legs above the
5 telescoping members when in the folded storage position.

The sets of legs fold inward and the extendable
braces shorten when in the folded storage position. In
the storage position, the framework for the legs is folded
substantially flat against the underside of the supported
10 deck. The legs mount to the deck and stationary framework

What is claimed is:

1. A folding support apparatus, for supporting a deck or the like, comprising:

a first pair of folding legs and a second pair of folding legs, wherein the first and second pairs fold toward the other pair;

extensible braces extending between corresponding legs of the two pairs, including an angled end portion, extending downward from ends of the extensible braces and pivotally mounting to the legs;

stop means associated with each of the folding legs, for limiting the folding motion in an unfolded position; and

upper mounting members defining a plane for supporting the underside of the deck or the like, wherein the extensible braces fold substantially flat under said plane in a folded position, whereby in use, the extensible braces fold substantially flat against the underside of the deck or the like.

2. A folding support apparatus according to claim 1, wherein the internal angle between the upper mounting members and the first pair of legs is greater than 90 degrees and the internal angle between the upper mounting members and the second pair of legs is less than 90 degrees.

3. A folding support apparatus according to claim 1, wherein the stop means comprises a member extending from the leg near an upper end of the leg.

AMENDED & RE-
FILED



4. A folding apparatus according to claim 1, wherein the legs fold over the extensible braces in the folded position and are spaced from the underside of the deck or the like by the angled end portions.

AMERICAN & CO.
1954



6. A folding support apparatus according to claim 1, wherein the extensible braces comprise telescoping members.

7. A folding support apparatus according to claim 3, wherein the stop member mounts to the leg and is configured to offset the leg by an angle greater than zero and less than 90 degrees from a direction perpendicular to the deck.

8. A folding support apparatus according to claim 3, wherein the stop member mounts to the leg at an oblique angle to a longitudinal direction of the leg.

9. A folding support apparatus according to claim 1, wherein the angled end portion extends at an oblique angle to a longitudinal direction of each of the extensible braces.



PCT

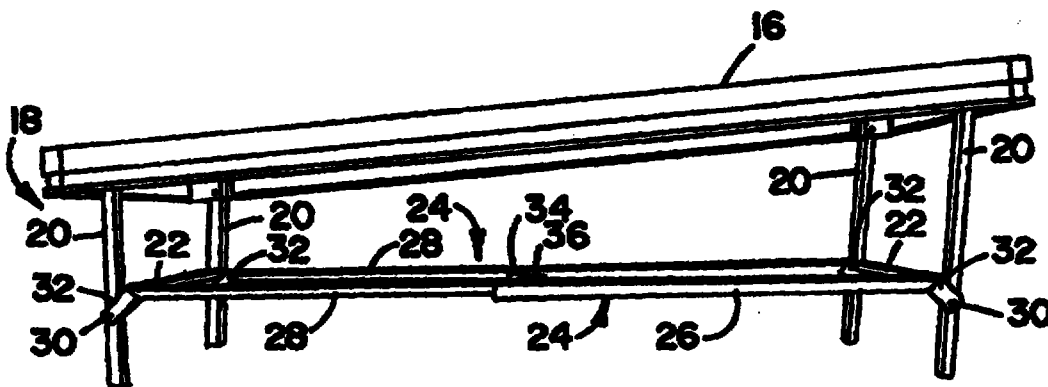
WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : E04H 3/28, A47B 3/08		A1	(11) International Publication Number: WO 96/26339
			(43) International Publication Date: 29 August 1996 (29.08.96)
(21) International Application Number: PCT/US96/02674		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 23 February 1996 (23.02.96)			
(30) Priority Data: 08/396,195 24 February 1995 (24.02.95) US			
(71) Applicant: SICO INCORPORATED [US/US]; 7525 Cahill Road, P.O. Box 1169, Minneapolis, MN 55440 (US).			
(72) Inventors: BOTTIS, Rollin, D.; 4617 Oxboro Lane, Bloomington, MN 55437 (US). SHANK, Donald, A.; 19923 Darrell Lane, Rogers, MN 55374 (US).			
(74) Agent: BRUESS, Steven, C.; Merchant, Gould, Smith, Edell, Welter & Schmidt, P.A., 3100 Norwest Center, 90 South Seventh Street, Minneapolis, MN 55402-4131 (US).			
		Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: FOLDING FRAMEWORK AND SUPPORT LEGS



(57) Abstract

A folding framework (18) for a ramp section (12) includes folding legs (20). The legs include extendable members (24) extending between the sets of legs with an inner sliding member (28) and an outer sliding member (26) providing for folding motion. The sets of legs (20) both fold inward to a storage position wherein extendable members (24) and the legs (20) lie substantially flat against the underside of a supportive deck (14). The extendable members (24) include an angled end portion (32) which extend downward and pivotally mount to the legs (20) for offsetting the extendable members (24) from the legs (20) when in the folded position.

This Sheet Has Been Replaced

