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Hanson

[11] **3,754,758**

[45] **Aug. 28, 1973**

[54] **VERTICAL SWING BEAM FOR AMUSEMENT AND EXERCISE**

[76] Inventor: **Richard A. Hanson,** 5750 Tamarack Way, Concord, Calif. 94521

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[52] **U.S. Cl.** ..... **272/60 A,** 182/100, 182/189

[51] **Int. Cl.** **A63b 9/00**

[58] **Field of Search** ..... 272/1 R, 1 B, 57 R, 272/60, 61, 65; 182/100, 189

[56] **References Cited**

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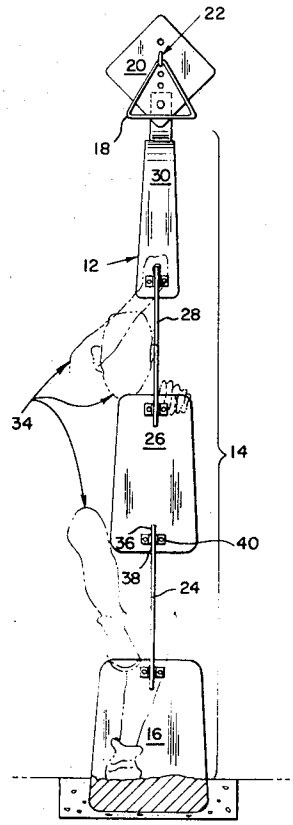
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Primary Examiner—Richard C. Pinkham
Assistant Examiner—R. T. Stouffer
Attorney—Manfred M. Warren, Herbert Rubin et al.

[57] **ABSTRACT**

A normally upstanding resilient structure for amusement and excercise of children or adults comprising a plurality of interconnected, vertically, aligned, elastically bendable plate sections arranged so that the faces of the plates thereof are generally non-coplanar, and having a rotatable top plate from which a handle is suspended for the user to perform the aforementioned activity. The structure is fixedly positioned at its base but is not secured thereabove so that the structure is free to perform a swaying movement when acted upon by the weight of a user grasping the handle.

6 Claims, 4 Drawing Figures



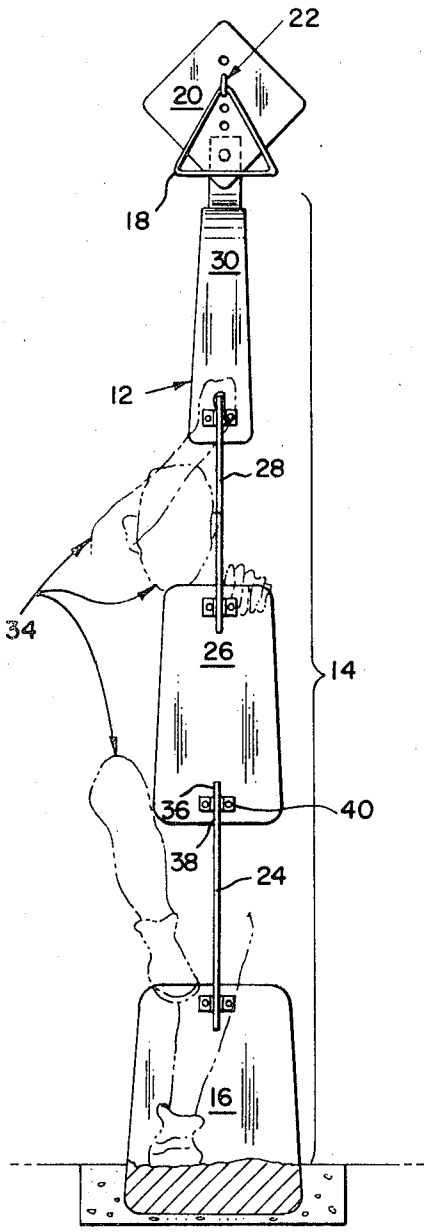


FIG. 1

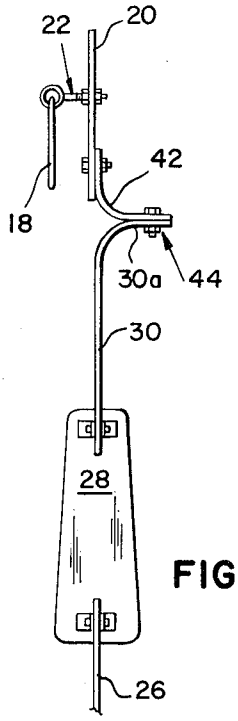


FIG. 2

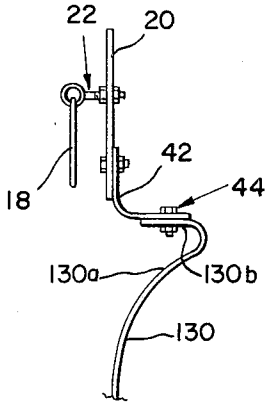


FIG. 2A

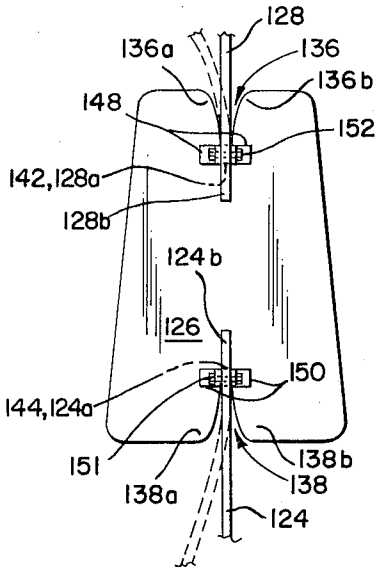


FIG. 1A

VERTICAL SWING BEAM FOR AMUSEMENT AND EXERCISE

This invention relates to amusement and excercise devices and particularly a type of flexible, upstanding, ascendible structure that a child or an adult can climb, suspend himself and then, due to the flexural character of the structure, swing about in countless different patterns of travel about the base of the structure.

Amusement and/or exercise devices of the same general character like those to which my invention relates are known. See for example U. S. Pat. No. 1,865,095 to Frei for AMUSEMENT APPARATUS patented June 28, 1932; U. S. Pat. No. 1,907,451 to Sibley for AMUSEMENT DEVICE patented May 9, 1933; and U. S. Pat. No. 3,246,893 and 3,480,274 to Boggild et al. for RESILIENT GYMNASTIC POLE DEVICE and GYMNASTIC AMUSEMENT DEVICE, respectively, patented Apr. 19, 1966, and Nov. 25, 1969. The persistence with which such devices occur in the art from years past to the present indicates the endurance of early interest, while a satisfactory solution has until now at least apparently evaded the industry and its contributors.

An analysis of the prior art with which I am familiar reveals several basic problems that probably have inhibited more widespread acceptance and success of such devices sometimes referred to as a "swing pole" or "spring swing." Generally, these earlier versions have relied for their "flexibility" upon one of two expedients: (1) a pivotal base connection in support of a generally rigid upright pole, wherein the pivotal base urges the pole to upstanding position by means of a spring loaded mechanical linkage; or (2) a flexible pole of generally uniform cross section, or uniformly tapered, wherein the flexural reaction is essentially dependent upon the stiffness of the pole. As a result, using the foregoing basic designs, the following disadvantages are evidently encountered.

In the case of the spring loaded base systems, the freedom of motion is generally unidirectional, thus creating a monotonous effect for the user; and even where the spring motion is made multi-directional, for example where a cluster of spring retarders in each of several directions is utilized, the motion is generally discrete, predictable and again, monotonous. Also, spring devices mounted at the base of a pole several feet in height, and called upon to resist and dampen movements created thereby even by a child's weight (let alone an adult) must of necessity be bulky and comprise relatively large components. Moreover, as can be seen from a cursory inspection of such devices, the base arrangements may be relatively complex mechanical assemblies indicating high initial costs and maintenance.

The flexible pole arrangements thus far disclosed by the prior art with which I am familiar also have several inherent undesirable features. First, bending resistance is generally the same in all directions, so again the ride experience when one swings from such a device tends to be predictable and monotonous. Also, pole dimensions of hollow pipes or solid materials must possess cross sections small enough to be flexible, yet heavy enough to sustain repeated cycles by users of various heighrs and weights. Such requirements are generally exclusive of each other, thus difficult to reconcile, especially using ordinary cross-sectional shapes (hollow

pipe, solid uniform sections, or composite uniform sections) and usually end up in a compromise which achieves neither a novel ride for the user, nor long life for the equipment. Furthermore, ordinary stock sections possess poor damping characteristics, so even where some of the foregoing difficulties may be overcome by using unusual materials, the problem still remains whether the equipment is safe both for the user and against premature failure.

Moreover, with respect to either of the foregoing basic types of swing poles, individual adjustment of the assemblies by the user is difficult if not impossible. That is to say the height and flexural qualities of a pole, once installed, are difficult to alter. The same can be said of changing the spring characteristics of a spring-urged pivot base.

Thus it is an object of the present invention to provide a generally upstanding resilient structure, hereinafter sometimes referred to as a spring swing, capable of supporting a relatively larege range of users and having flexural characteristics which vary depending upon the direction the user is swinging, thus achieving a ride which is generally unpredictable and different from one time to the next, even for the same user.

It is also an object of this invention to provide a resilient spring swing structure which achieves its flexural characteristics and effective damping without the use of a pivotal base of any kind, spring loaded or other.

A further object of my invention is to offer a vertical flexural device whose overall height and flexural characteristics may be relatively easily altered to suit different ranges of sizes and weights or users.

A feature and advantage of my invention is that it may be fabricated of relatively commonplace stock materials in simple shapes, and does not require elaborate auxiliary mechanical assemblies.

It is also an object of the present invention to provide a spring swing having an uppermost section that is rotatable about an off-set vertical axis thus self-adjusting to face into the "wind of travel" and provide additional damping of the entire system, thus adding safety as well as variability to the ride experience. Such swivel action of the uppermost section of my spring swing has the added safety feature that if a user, particularly a child, happens to stand near the device when it is poised for action, and is accidentally released out of control, the uppermost section, if it does graze the bystander, will rotate thus to minimize, if not eliminate altogether, any injury.

Still other significant safety features and advantages are achieved by the structure of the preferred embodiment of my invention which comprises a series of orthagonal, interlocked, flat plates secured in end-to-end relationship to each other with the face planes of adjacent plates normal to one another. The use of such plates provides a large surface area for aerodynamic damping, should the spring swing be poised for action and then suddenly released.

Moreover by the use of the aforementioned orthagonal plates, each, in successive ascending position, may be shaped to provide a tapered beam, wide at the bottom and narrow at the top. Such design increases safety because when the beam bends, it bends as much at the top as at the base — as opposed to an ordinary pole which would bend more at the base than at the top — so that with my spring swing, when poised for action and then suddenly released, the spring back motion

near the base is relatively slight; and a user will be reasonably safe even standing directly in the path of the swing; since most of the shipping motion will be at the top of my structure — and even this motion will be damped by the action of the uppermost section, especially, mentioned above.

Numerous other objects, features, and advantages will become apparent to one of ordinary skill in the art to which this invention pertains, upon a reading of the specification that follows and by reference to the accompanying drawing which together explain certain embodiments of my invention.

Turning now to the drawing, FIG. 1 is a general side elevation of one embodiment of my invention;

FIG. 1A is an enlarged view of the central section of the structure shown in FIG. 1, except that the plate section shown therein is typical of an alternate and preferred embodiment thereof;

FIG. 2 is a side elevation of the corresponding portion thereof shown immediately adjacent thereto at FIG. 1;

FIG. 2A is a portion of the same structure as that shown at FIG. 2, except that upper plate **30** is shown in an alternative form.

My invention is best understood by referring first to FIG. 1 wherein I show spring swing **12** generally comprising upright spring beam **14** wherein the lowermost portion thereof, planar section **16,** is imbedded in the ground by means of concrete or some other suitable expedient to support the device in its normally upstanding position and restrain the system against capsizing during normal useage in a manner disclosed in greater detail hereinbelow.

Use of my highly entertaining and healthful exercise device is initiated by the user grasping handle **18** that depends from uppermost planar section **20** to which it is secured by means of a conventional swiveling eyebolt assembly **22.** Since preferably the distance from the bottom of handle **18** to ground G should exceed the height of the user, be he child or adult, handle **18** is reached by simply climbing the ascending, vertical planar sections **24–30** in the manner suggested by the schematic anatomical outline of a user **34** in FIG. **1.** Once within the reach of handle **18,** the latter is grasped by the user. Then, by virtue of the user's weight and maneuvering action, the entire spring beam **14** is deflected from its normally upstanding position to a generally arc-like configuration with the user standing on the ground with handle **18** in hands overhead several feet from base section **16.** Thereafter, in a manner to be explained in somewhat greater detail below, the user, generally with the assist of a gentle jump, is caused to be trajected by the spring beam, from which he remains suspended by handle **18,** in the beam's reaction to return to its normal upright position.

It is a particular feature of my invention that the spring beam **14** may be constructed of relatively stiff metal sections and at the same time provide an overall structure that has interesting flexural characteristics capable of reacting upon the user to provide a nearly indefinite number of different trajectory paths and speeds. This is accomplished by the use of interconnected plates **16, 24–30,** and **20.** Each of these plates is fabricated of an elastically bendable material such as aluminum, sheet steel, or the like, and designed so that the flexing action of spring beam **14** referred to in greater detail below, the yield strength of the material is not generally exceeded. The plates are formed, in the case of those shown at FIG. **1,** with interlocking slots **36** (plate **24**) and **38** (plate **26**), a typical connection design used at each of the several plates shown, although repeated descriptions here would be unnecessarily redundant and are therefore omitted. The connection at each such interlock is completed by a conventional bolt and bracket assembly **40** which assures that adjacent plates remain together; and that adjacent plates are held at right angles to each other.

By means of the aforedescribed plate interlocking connections, the entire array of elastically bendable members **16** and **24–30** are connected in end-to-end vertical alignment to form the generally upright spring beam **14** with the corresponding flat faces, the major planar surfaces of each of the adjacent sections defining intersecting, non-coplanar surfaces. By this configuration, and overall flexural characteristics of composite beam **14,** in respect to a force applied by a user from any direction, is a combination of the relative limberness of a flat plate, alternated with the relative stiffness of a plate on edge, or combinations thereof depending upon the direction of the applied user force. It is this flexure combination, provided by elastic member oriented toalternately stiff and limber bending characteristics, that awards the spring swing of my invention its fundamental beneficial quality of strength and remarkable resiliency. Indeed by such a design I may employ tough metallic materials and achieve the flexibility of fiber glass or plastic, without the detriments of low strength and undurability often encountered with those materials. Of course, plastic, fiber glass or other materials may be used with my invention for certain special versions thereof, such as in nurseries or where only small users are accommodated.

As a further aspect of my invention, I mount handle **18** by means of swivel bolt assembly **22** on to plate **20** which in turn is secured to bracket **42**; and the latter is rotatably secured to horizontal edge **30***a* of plate **30** by means of rotating joint assembly **44,** which is thus offset from the face of plate **30** and the major axis of spring beam **14.** In this way I not only provide further freedom of movement for handle **18,** but also plate **20** may now act as a damper against excessive beam movement. This is so because of the relation between the force exerted by the user's weight and the swivel action of rotating joint **44,** which together act to cause the face of uppermost plate section **20** to remain normal to the direction of travel of the spring beam, when the latter trajects during operation.

Thus it may be appreciated that my spring swing invention compositely provides a damped vertical riding spring or spring beam **14** with rotating plate **20** and swiveling handle **18** suspended therefrom. Accordingly, a user may climb up on my spring swing, grab hold of the handle, remain suspended from the end of the beam, jump off and descend relatively slowly to the ground. The user can then continue jumping from the ground and be pulled all the way up to the jumping off position, or swing and spin with "roller coaster" effect around the beam in an almost infinite variety of path patterns.

A further benefit of the aforedescribed damping effect afforded by plate **20** is the added safety imparted thereby to users and bystanders. That is, even if a user or spectator should inadvertently be contacted by a moving portion of the spring beam, the effect of the

damping plate will minimize the impact of such contact. The swivel connection of the plate itself to plate bracket **42** will also allow the plate to deflect more or less harmlessly away from direct contact with a person, if contact should happen to be with that end.

A related safety feature of my invention, and one of great importance whether dealing with children or adults, is that the spring beam is fabricated so that the topmost sections are flexed to a degree nearly equal to that of the base sections, a condition just the opposite to say an ordinary spring pole which bends more at the base than at the top when flexurally deflected and thus creates a dangerous whipping condition when released. The safer nature of the design of my invention — nearly equal flexing of the top sections to that of the base — is achieved by fabricating each of the elastically bendable sections **16** and **24–30** to a tapered profile in face elevation, and by arranging the vertical array of such tapered sections that form spring beam **14** with the wider dimension of each section at the bottom, and with each successive section having a base narrower than the top of the section immediately therebelow. Thus the plate sections at the top are more flexible than those at the bottom, giving the beam its desirable flexing characteristics.

Moreover, by the use of flat plate sections at right angles to each other to build up spring beam **14,** I provide the beam with effective aerodynamic damping, further adding to the safety of the device. That is, regardless of the direction in which the spring beam may traject, a major portion of the total flat plate area of all of the plate sections will offer wind resistance thereto. Such action further reduces the speed with which the beam trajects, thus contributing further to the safety of the entire system.

AT FIG. 1A I show a more detailed and preferred fabrication of the plate sections referred to hereinabove. In particular this preferred includes an improved manner of interlocking and connecting the vertical plates and is illustrated showing a fragmentary section of a spring beam comprising plate **126,** and portions of plates **124** and **128** which correspond, respectively, to plates **26, 24** and **28** in FIG. **1.** By the particular construction of the preferred embodiment I am able to achieve an even more bendable and flexible beam with less imposed fatigue stressing than is believed to be the case with the type of construction shown in FIG. **1.**

More specifically, in the preferred version of FIG. 1A. the planar plate sections referred to hereinabove now take the form of specially formed slotted sections, such as plate **126, 124,** and **128,** located alternately in end-to-end vertical arrangement to form spring beam **14.** Each slotted plate is typified by plate **136** whose description which follows is applicable to the others as well.

Plate **126** is fabricated to provide a pair of longitudinal slots **136, 138** having termini **142** and **144,** respectively, which, when assembled, contact confronting edges **128***a* and **124***a* of plates **128** and **124,** respectively. Interlocking plates **124, 128** also have formed therethrough longitudinal slots bounded by lobes **124***b*, **128***b* and are secured to adjacent plate **126** by clamp brackets **148, 150.** Clamp bolt assemblies **151, 152** associated with the brackets may be tightened to firmly secure adjacent plates **124, 128** in position within slots **136, 138.**

The open ends of slots **136, 138** formed to have rounded corners **136***a*, **136***b* and **138***a*, **138***b*, respectively, designed to bear against the faces of the plates **124, 128** housed within the slots when the latter plates are deflected during operation (see dashed line indications thereof in FIG. 1A). In a similar manner curved slot portions of plates **124, 128** will, when plate **26** is deflected, form a receiving surface for portions of the latter plate. In this manner it will be apparent that I achieve the salutary effect of relieving plates **124, 126,** and **128** from sharp bending when deflected and at the same time provide rounded stopping surfaces to support the flexibly deflected plates.

As a further refinement of one aspect of my invention, I show in FIG. 2A an alternative configuration of plate **30** in the form of plate **130** therein. By shaping plate **130** to provide a rentrant curve between the face of the plate (**130***a* and the horizontal edge **130***b* to which bracket **42** is rotatably secured by swivel bolt **44,** dependent handle **18** is placed in a better position for being grasped by the user when ascending the beam in preparation for use.

In connection with the aforementioned refinement, the alternative shape of plate **130,** another feature of my invention becomes apparent. That is the adjustability of position of damping plate **20** by rotating the latter about swivel bolt **44.** More specifically, when a taller or heavier person uses the device, the position of the plate as shown in FIG. **2** is satisfactory. When a somewhat smaller user mounts the spring beam, handle **18** may be brought somewhat closer to the ground, when fully deflected to starting position, by rotating plate **20** 90° about the axis of bolt **44.** A still further adjustment may be made for the smallest of users by swinging plate **20** 180° about swivel bolt **44.** Even more adjustment may be achieved by providing a more or. less extended flange **30***a* with several bolt hole mounting positions for swivel bolt **44.**

As one example of my invention I have obtained satisfactory results in accordance with the following:

a. The total height of the structure from base level to the top of the damping or uppermost plate in normal undeflected position, 8 feet — 2 inches.

b. All plates fabricated of alloy aluminum stock approximately 0.2 inches thick, except for the damping plate which is 0.1 inch thick.

c. All plates, except the damping plate and the plate immediately beneath, are formed to provide the same overall length, and all slotted to the same depth.

d. The unit is mounted by conventional bracket assemblies on a cruciform base made of intersecting and bracketed 2 × 4's approximately 6 feet long, thus providing a stable and portable base.

It is also possible to use a laminate plate construction, formed of a "sandwich" comprising, for example two thin outer metal sheets with a layer between formed, for example, of a plastic or other suitable clamping material.

It may be noted that a feature of the modular plate construction of my invention is that by adding or deleting plates or varying stiffness, i.e., thickness or width, the same basic assembly may be adapted for use by small children, juveniles, or adults.

These and many other variations of my invention will be apparent to one of ordinary skill in the art after a study of my disclosure herein.

While I have described my invention for use by a single rider at a time, an interesting variation may be achieved by substituting handle **18** with a depending, extended handle (not shown). Such extended handle in the form of an inverted T-bar may be grasped by two users at once — one at either end thereof — thus to provide a two-man riding device.

A still further handle variation is to substitute a flexible line loop, such as a rope loop, for handle **18**; or add such a loop to the existing handle as shown.

I claim:

1. A flexible, normally upstanding device, sometimes referred to as a spring swing, for amusement and exercise of child and adult users comprising;

a plurality of elastically bendable planar sections;

securing means to connect said sections in end-to-end vertical alignment to form a generally upright spring beam with the corresponding faces of adjacent sections defining intersecting non-coplanar surfaces;

handle means secured to and depending from the uppermost one of said sections, last said means adapted to be grasped by a user when the latter ascends said device to within reach of last said means, said spring beam being elastically deflectable from said normally upstanding position to a generally arc-like configuration by the action and weight or a user when grasping said handle means, and thereafter cause the user to be trajected by the beam in its reaction to return to its upright position; and

means associated with the lowermost portion of said device to support the latter in its normally upstanding position and restrain the device from capsizing during maneuver by a user.

2. The device in accordance with claim **1** and wherein further each of said elastically bendable planar sections is shaped so that said spring beam comprises a vertical array of tapered sections each wider at the base than at the top with each successive section having a base narrower than the top of the section immediately therebelow.

3. The device in accordance with claim **1** and wherein further said securing means is designed to position adjacent ones of said sections with the corresponding face planes thereof normal to each other.

4. The device in accordance with claim **1** and wherein further said planar sections comprise:

slotted sections, each of which has a closed end or terminus and an open end, said slotted sections located alternately in the end-to-end vertical arrangement thereof to form said spring beam, each of said slotted sections fabricated to provide a pair of longitudinal slots formed therethrough shaped to receive the confronting edges of adjacent ones of said solid sections, the open ends of said slots formed to have rounded corners designed to bear against the faces of adjacent sections housed within said slots when the latter plates are deflected during operation of said device; and wherein further said securing means comprises:

clamp brackets mounted on said slotted sections proximate said slot termini; and clamp bolts to urge said brackets into frictional engagement with confronting ends of adjacent sections and to retain the latter in operative position within said slots.

5. The spring swing in accordance wit claim **1** and wherein said securing means connecting said uppermost section to said spring beam comprises:

bracket means rotatably secured to the one of said sections immediately below said uppermost section to swivably mount said uppermost section to the next lower section, said bracket means axis of rotation parallel to and offset from the face of the next lower section to cause the face of said uppermost section to remain normal to the direction of travel of said spring beam when the latter trajects during operation.

6. The spring swing, in accordance with claim **1** and wherein further each of said planar sections is shaped to form a stepping surface for the feet of a user, and hand holds for use in ascending said spring swing beam.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,754,758 Dated Aug. 28, 1973

Inventor(s) RICHARD A. HANSON

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the drawing, in FIGURE 1, the missing reference letter --G-- should be added to indicate ground level.

Column 1, line 65, "heighrs" should read --heights--.
Column 2, line 20, "larege" should read --large--. Column 2, line 32, "or" should be changed to --of--. Column 2, line 53, "orthagonal" should read --orthogonal--. Column 2, line 59, "orthagonal" should read --orthogonal--.
Column 3, line 3, "shipping" should read --whipping--. Column 3, line 32, "useage" should read --usage--. Column 3, line 49, after "in" should be inserted --user's--. Column 3, line 65, after "that" should be inserted --in--.
Column 4, line 18, "and" should be changed to --the--. Column 4, line 24, "member" should be changed to --members--. Column 4, line 25, "toalternately" should be changed to --to alternately--. Column 4, line 37, "on to" should be changed to --onto--. Column 5, line 36, "AT" should be changed to --At--. Column 5, line 38, "preferred" should be followed by --fabrication--. Column 5, line 50, the period "(.)" should be changed to a comma --(,)--. Column 5, line 54, "plate 136" should be changed to --plate 126--.
Column 6, line 1, after "138" should be inserted --are--.
Column 7, line 28, "or" should be changed to --of--.
Column 8, line 4, "face planes" should be deleted and --faces of the sections-- inserted.
Column 8, line 26, "wit" should read --with--,

Signed and sealed this 4th day of June 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

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