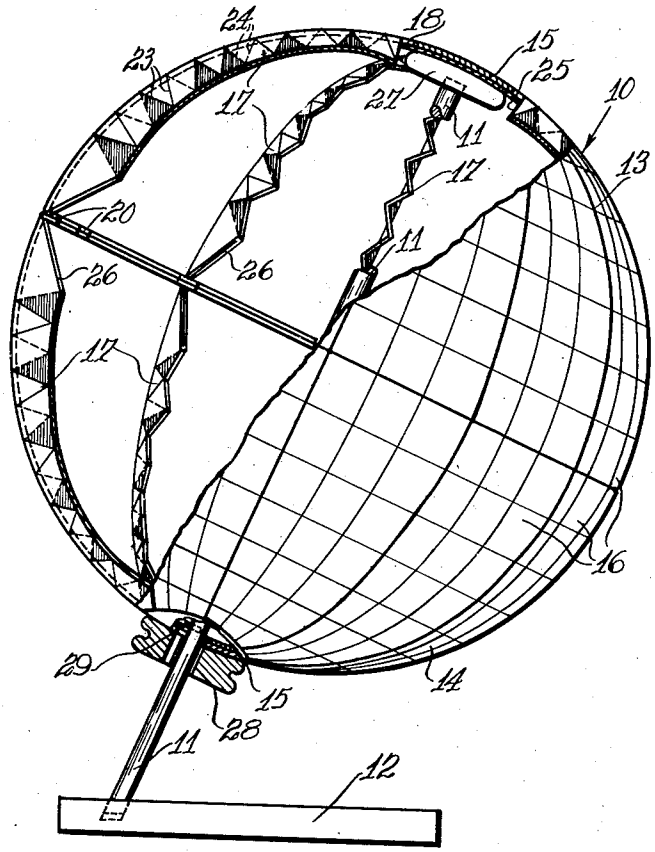
June 27, 1944. C. E. RIDDIFORD 2,352,225

MAP, GLOBE AND GLOBE CONSTRUCTION

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Fig. 1



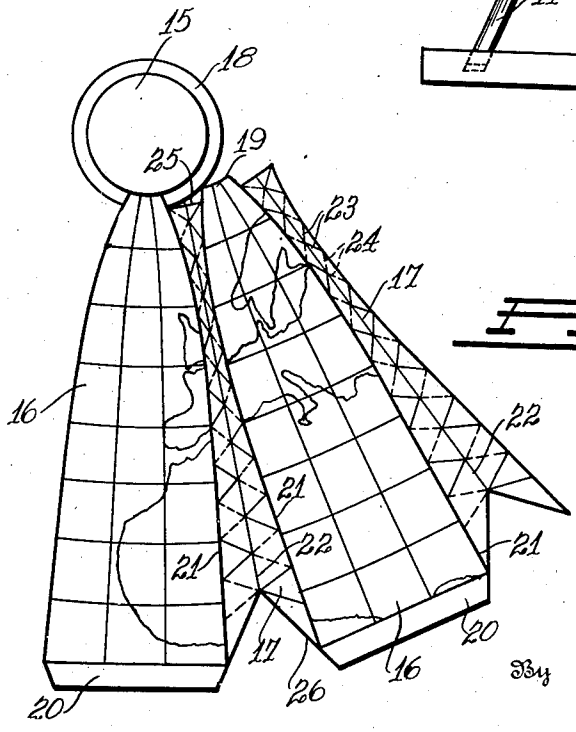


Fig. 3

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Fig. 2

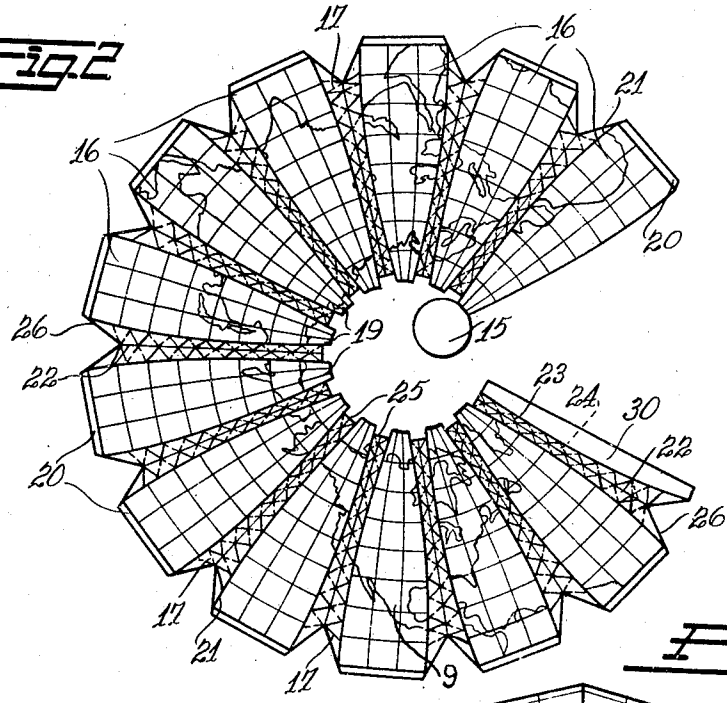


Fig. 5

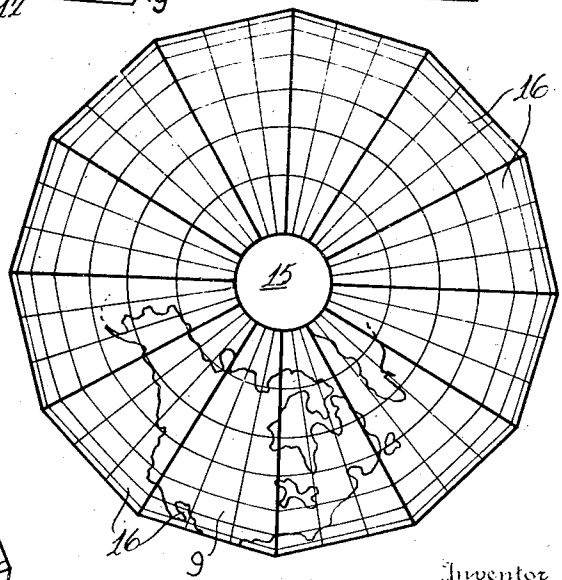
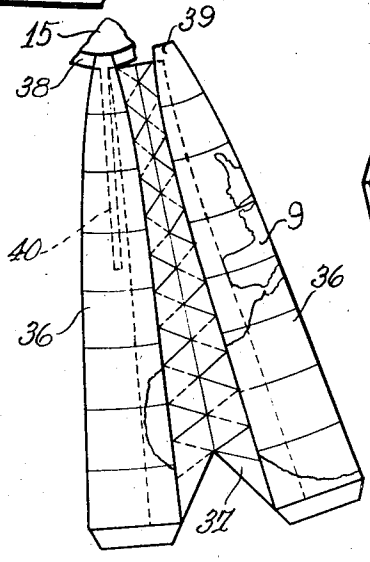


Fig. 4



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2,352,225

MAP, GLOBE, AND GLOBE CONSTRUCTION

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Application August 22, 1942, Serial No. 455,804

17 Claims. (Cl. 35—46)

This invention relates to globes and more particularly to improvements in globe construction which may be formed of light material yet substantially reinforced whether the finished construction is to be in the formation of an integral sphere or as primarily intended of collapsible formation whereby it may be packed in a substantially flat formation.

While I am aware that numerous attempts have been made to produce geographical globes made up of sections which may be distended or folded, all the disclosures of such proposals of which I am aware appear to be impractical or even inoperative and not adaptable for the purpose for which they are intended. The primary purpose of the present invention is to overcome such difficulties and provide a practical globe formation inexpensive to produce and yet be strong, durable and accurate, thereby providing globes which may be widely used in educational institutions, as well as for other purposes, including field work.

With this purpose in view the invention has for an object to provide a sectional construction comprising printed gore elements having connecting elements which will accurately align the printed sections in abutting relationship from a polar section to which they are secured or attached to the equator as well as aligning two hemispheres at the equator. In geographical globe construction as it has been carried out heretofore wherein either separate printed gore elements or such gore elements are attached to a common plane section at each of the poles such elements have been secured by adhesives to a spherical globe element and in doing so it has been difficult to obtain proper alignment of the elements glued to the spherical base; the gore elements and plane section tend to buckle and the gore sections to overlap and thus much time is required in the attempt to overcome such difficulties.

Wherefore, according to the present invention, the sections are printed and are of sufficient weight to constitute a spherical or substantially spherical body and are provided with interconnecting web elements which when folded upon each other in the globe erecting process accurately align the printing on adjacent sections and bring adjacent sections together in an edge abutting relationship throughout their entire length from the points where they are fastened to a small polar plane section to the equator. Such interconnecting web elements when in their erected positions provide a substantial reinforcing and locking element along the entire length of the abutting edges of the gore sections.

Another object of the invention is to provide such a gore section connecting web structure fabrication as to permit the bending thereof as the globe structure is being erected and yet the bending of the web being so arranged as to produce the proper curve formation of gore sections as the collapsed hemispheres are distended in erecting the globe.

A further object of the invention is to provide printed formed sectional elements of the globe which may be readily assembled by the students in school class rooms as a part of their instruction course in connection with their study of geography.

Still further objects, details, and advantages will appear in the following specification and claims in conjunction with the accompanying drawings illustrating a satisfactory embodiment of my invention wherein—

Figure 1 is a fragmentary side elevation of a globe constructed in accordance with my invention, parts being in section and broken away or omitted in order to show certain features of construction, and exaggerated to emphasize construction details.

Figure 2 is a plan view of a printed and fabricated sheet comprising elements of one of the hemispheres.

Figure 3 is an enlarged fragmentary plan view being a portion of Figure 2 illustrating details of the web formation between gores and to which is added a polar plane disk element.

Figure 4 is a similar fragmentary plan view of a slightly modified construction in accordance with my invention.

Figure 5 is a polar end view, on a reduced scale showing a globe formation in accordance with Figures 1 to 3 wherein the gore elements are formed in substantial accordance with secant measurements along latitude lines.

Referring to the drawings it is to be noted that the illustration of several features are exaggerated and parts omitted in Figure 1 to more clearly disclose the novel features of construction in accordance with the present invention; several of the inter-connecting and inter-locking web elements are omitted and the zigzag interlocking formation of those illustrated is emphasized to some extent for illustrating the lock formation. Further, as illustrated in Figure 5, when the gore elements of the globe are conventionally designed with the parallel or latitude line measurements, as is preferable under most

conditions, the globe formation will properly assume a shape with flattened parallels. However in constructing a globe with gores having true curved measurements it is desirable that, when the gores are assembled, each gore will be given a spherically curved formation and the composite structure will be substantially a sphere, as will be hereinafter pointed out and described.

In general, Figure 1 illustrates a globe 10 carried on a shaft 11 which is mounted at the ecliptic angle in a base 12 as is common practice with respect to geographical globes. The globe is printed or impressed with indicia, such printed matter being generally designated 9 on several of the figures of the drawings. Such printed matter or indicia comprises the usual geographical map contours and lines of latitude and longitude and as set forth the map contours on various gores should be aligned with precision.

In the construction thereof, in accordance with present invention, globe 10 consists of two hemispheres 13 and 14, each comprising elements of paper, cardboard, plastic, or other suitable pliable sheet material. Each hemisphere consists of a circular polar section 15 which corresponds to the globe surface beyond the 80° meridian in accordance with a highly satisfactory construction and a plurality of gore sections 16 extending from said polar section and composing the remainder of the hemisphere surface.

As shown in Figures 2 and 3, in construction, one only of the gore sections 16 is integral or formed continuous in the sheet with the polar section 15 and each of the others is printed and stamped in serially relatively spaced positions on the sheet. Between each gore and its adjacent gore, the continuous sheet material is stamped in a manner, as presently will be described, to provide an integral connecting web element 17.

The polar section 15 is provided with a circular backing and connecting element 18 comprising a disk to which the polar section is adhesively secured centrally thereof so that the edge of the disk extends concentrically a short distance, (3°, 5° or as may be desired) beyond the polar section to provide a mounting area to which the inner ends 19 of gore sections 16 are successively secured by adhesive means of glue, cement, or other suitable adhesive material such as Celluloid cement, or by any other securing means as may be desired until all gores 16 are secured in place and thus, accurately positioned, completely surrounding the polar section 15. As will be observed, disk 18 provides reinforcing for the polar section 15 and its relative size or the amount it is arranged to extend with respect to section 15 is determined in accordance with the reinforcing required. The flexibility of the material in order to bear the strain afforded by shaft 11 which bears against the polar areas in maintaining the collapsible hemisphere elements in their distended positions when the globe is erected is also a factor to be considered in determining the size and extent of this disk.

One of the printed and stamped hemisphere sheets has the outer end of each gore section 16 provided with an extending tab portion 20 which is adapted to be folded under the gore and adhesively secured to the corresponding continuation gore section of the complementary hemisphere thereby securing the two hemispheres 13 and 14 together by hinge elements around the equator. These connections comprise hinge elements around the equatorial periphery of a collapsible or folding globe permitting the globe to be collapsed or relatively flattened for the purpose of packing or storage, at which time the connecting hinges are separated with respect to each other.

When the globe elements are distended to form a sphere these hinge elements are drawn together by means of the integral web elements 17 and the greater the outward pressure exerted against the pole elements 15 the tighter the equatorial hinge elements are drawn together.

The connecting web elements 17 as pointed out, operate to draw together and press adjacent edges of the gore elements into abutting relationship so that the printing or impressed matter 9 is matched along the longitudinal lines forming edges of the gores and as the result of this operation the tendency is for the gores to form a continuous surface. More particularly in the construction of the web elements in order to perform this function tending to effect a spherical curvature of the gore elements, the webs must themselves be capable of bending for longitudinal curvature.

When, as in the present construction, the web-elements 17 are an integral part of the continuous sheet of flexible material including the printed gores, the gores must not only be foldable longitudinally but also formed to produce and follow the curvature of the globular longitudinal lines. Hence in the stamping and printing operations of each hemisphere sheet the sheet is scored along the edge longitudinal lines 21 of the gores and exactly half way between the gores at 22 in the web section 17. It is essential for accuracy in fitting the gore sections together when the globe is erected that this scoring of the web should be as accurate as possible so that when folded back, or diametrically inwardly of the globe, and the two sides of web section 17, as defined by the midway score line 22, are bent together, the edges of the adjacent gores will abut each other. And since the printing and stamping of the sheet is performed in a machine always with the same precision the human element, as performing the operation by hand, is eliminated. It will also be seen that score lines 21 along the gores, are in the face side of the sheet, while the scoring along line 22 is in the back side of the sheet.

In order to permit longitudinal curving of folded web, as it must do as the gores are drawn together in distending the globe, each side of the web section 17 is scored diagonally, as indicated by score lines 23 and 24, which are arranged so that preferably the points of intersection of lines along the edges of the gores are equally spaced from end to end of the web to permit uniform curvature of the gore elements when the globe is erected. The diagonal scorings in web section 17 are arranged alternately in the face side of the sheet and on the back of the sheet, respectively represented by full lines 23 and dotted lines 24, thus permitting a zigzag bending of the inner edges of the web sections which substantially follow the diametral planes throughout the longitudinal lines along the edges of the gores. This zigzag formation also operates as an interlock maintaining the sides of the web in contacting engagement.

It will be observed that the ends 25 of these web sections, adjacent the pole sections 15 are formed to abut the edge of disk 19 and the web provides a continuous connection between the

gores beyond this polar area to their ends at the equator. This connection is uninterrupted even though the ends **26** adjacent the poles are diagonally cut forming a V cut in the web sections **17** as shown in Figs. 2 and 3. This diagonal formation of the ends **26** as shown also facilitates the operation of folding or distending the globe and allows it to be flattened to a greater degree than could otherwise be possible since the web section is considerably wider, about three times wider, at end **26** than at end **25**, in the construction. This does not materially reduce the reinforcing strength in the region of these ends since the web extends normally inward of the globe to the equator where it is additionally reinforced circumferentially.

Since the outer edges, or longitudinal lines, of the gores are curved, the width of the web section is a minimum width substantially midway of its length corresponding substantially with the temperate zone. It has been found that this arrangement operates satisfactorily, not only in providing the proper stresses in the web in reinforcing the longitudinal lines of the globe but provides a compact arrangement for the printing and stamping operations which includes the scoring as well as severing of the printed or impressed hemisphere forms **13** and **14** from the sheet or sheets on which they are impressed.

If desired the gores **16** may be differently arranged and thereby modify the relative shape and size of the web sections, increasing or decreasing the size thereof, noting however that for a collapsible globe there should be a substantial width to the web section adjacent to the polar section, sufficient at least to bend and provide a reinforcement which will draw the gore edges along the longitudinal lines into engagement and positively hold them in place.

In order to erect the hemisphere sections **13** and **14** and maintain them erected within the northern hemisphere a socket member **27** such as a wooden or other plastic material circular block may be adhesively or otherwise secured to the surface of disk **19** of the northern hemisphere section **13** so that the socket thereof is concentric with the axis of the globe. Similarly an axially bored handle member **28** may be secured to the outer surface of polar section **15** of the southern hemisphere section **14** and sections **15** and disk **19** are correspondingly axially perforated. Thus the shaft **11**, which may be a round wooden dowel, may be inserted through the bore of handle member **28** so that its end will engage in the socket member **27** and then by holding handle **28** and projecting shaft **11** axially the globe will be erected, drawing the gores closely together. Any suitable form of catch, well known, such as a bayonet joint, umbrella catch, a pin of metal or wood or other composition may be inserted through cooperating apertures in the shaft **11** and handle **28**. Or as shown, a stud **29** projecting from shaft **11** which can be inserted through a kerf extending along the bore of handle **28** and when the globe is in a fully erected position with the stud entirely through handle **28** the shaft can be given a slight turn to position the stud beyond the kerf and thereby maintain the globe erected. The lower end of shaft **11** is then inserted in the socket of base **12** which also may be of non-metallic material. It is to be noted that the entire construction may be of light compositions and yet extremely sturdy and serviceable for instruction and other purposes as well where a comparatively large size globe is desired and which may be folded for storage in a relatively small space.

As mentioned the globe may be marketed in an assembled form as described or for instruction purposes the various elements may be sold and assembled by the student. In this event the hemisphere sections **13** and **14** in their flat printed or impressed stamped form as well as the other elements are included unassembled. In assembling either at the points of production or by the student the element, disk **18**, is first secured to the polar section **15** if it has not already been done, then the tab **30** on the web section **17** at the free end of the sheet from the gore section **16** integral with pole section **15** is adhesively connected to the said gore section. After this the ends **19** of gore sections **16** beginning with the gore section **16** integral with pole section **15** are successively adhesively secured to disk **18** in closely abutting relationship with each other and the periphery of pole section **15**. The assembly is then complete when the socket and handle members **27** and **28** are secured in place on the two hemisphere sections and the tabs **20** of gores **16** are secured to the corresponding gores of the complementary hemisphere section which has been similarly assembled. The globe as thus assembled is in its folded or collapsible condition and is ready to be erected for use. The fold lines by scoring having been performed in the stamping and printing operation there is obviously little chance for inaccuracy to occur due to assembly and the globe thus assembled, when erected the parts will come together with precision.

The globe as described and constructed has 12 gores, that is, 30 degrees each, to each hemisphere, which has been found to be highly satisfactory in globes 12'' in diameter. These gores are curved lengthwise and the tendency of the construction is to curve them along lateral meridians as well. However such curvature may be effected by an internal coating of varnish, lacquer or cellulose on the gore sections tending to curl or curve them, or an external spraying thereof on the exterior surface of the assembled and distended globe will have a tendency to do so as well as adding to the finish thereof. Further both the interior and exterior surfaces of the globe may be so coated. Again, the gores may be given the required curvature in a pressing and finishing operation so that when the globe is erected it will be spherical in formation.

Again the construction of hemisphere sections **13** and **14** provides a decided improvement for the construction of non-collapsible globes since the separate hemispheres assembled as described, may be submitted to the further process of cementing the web sections **17** as integral reinforcing webs along longitudinal lines and pressing them into hemispherical shapes, and then uniting them along their edges at the equator. In this case paper or other plastic sheet material may be employed and the resulting finished globe can be light and strong, due to the integral reinforcing webs along longitudinal gore lines. Further the misalignment of the printed or other impressed matter, and buckling and overlapping of impressed gore sections is clearly overcome by the new construction and process in accordance with my invention.

In accordance with Figure 4 which shows a slight modification from the globe sections shown in Figures 2 and 3, which is particularly adaptable for large size globes, 25'', 30'' and more, the construction is the same except that gore sections **36** are 15° instead of 30°. One of gore sections **36** may

be integral with pole section 15 as in the arrangement hereinbefore described, but preferably the gore sections are all separate therefrom and from each other; they are adapted to have their ends 39 secured to the disk 38 in closely abutting relationship with pole section 15 in the manner already described. Of course for small globes employing 15° gores light weight sheet material may be employed and the web sections 37 may be integral therewith, the same as in hemisphere sections 13 and 14. In large globes it is preferable that the gore sections 36 should be separably formed of heavy composition sheets with separate web sections 37 of lighter material secured thereto. It is obvious that a greater precision of the spherical curvature will be attained by using narrower gores which is preferable, particularly for larger sized globes. While globes up to 25" in diameter are satisfactory with the 15° gores it is obvious that still narrower gores may be employed. Thus the two forms showing 30° and 15° gores are illustrative of the method of sphere and globe construction in accordance with my invention.

Further, as shown in Figure 4, polar disk 38, which, as pointed out, is preferably composed of flexible material, may be provided with a series of radially extending strips or fingers 40 either integral with or secured thereto. These strips are so arranged and are of such a length as to engage each gore longitudinally for a substantial distance in an intermediate position between the reinforcing webs. These strips or fingers being resilient cooperate with the web elements in distending the globe into a spherical formation.

It is to be understood that the forms of the invention herein shown and described, are to be taken as but examples or illustrative thereof, and that various changes in shape, size and arrangement or combination of parts may be resorted to without departing from the spirit of the invention, as may fall within the scope of the following claims.

I claim:

1. A globe comprising a plurality of gores defining areas between longitudinal lines of the globe, each of said gores having impressed matter thereon and said gores adapted to be positioned in edge abutting relationship to bring corresponding impressed matter on the gores in alignment, and continuous reinforcing web elements interconnecting the gores extending substantially throughout the length of their lateral edges so as to bring said lateral edges into abutment with the impressed matter on successive gores in alignment in the erection of the globe.

2. A globe comprising cooperating hemispheres, wherein each hemisphere includes a plurality of gores defining areas between longitudinal lines of the globe, each of said gores having impressed matter thereon and said gores adapted to be positioned in edge abutting relationship to bring corresponding impressed matter on the gores in alignment, and continuous reinforcing web elements interconnecting the gores extending substantially throughout the length of their lateral edges so as to bring said lateral edges into abutment with the impressed matter on successive gores in alignment in the erection of the hemispheres, and means for connecting the hemispheres in cooperative relationship.

3. In a geographical globe or like construction, the structural element which consists of a flexible sheet upon which are impressed globe sections, comprising a plurality of gore sections in serially spaced relationship with respect to each other, thereby defining between each of the successive gore sections a continuous integral interconnected web section, and a circular polar printed section adjoining one of the gore sections on the flexible sheet.

4. In a geographical globe or the like, the structural element which consists of a flexible sheet upon which are impressed globe sections, comprising a plurality of gore sections in serially spaced relationship with respect to each other, each of said gores having impressed matter thereon and said gores adapted to be positioned in edge abutting relationship to bring corresponding impressed matter on the gores in alignment, thereby defining between each of the successive gore sections a continuous integral interconnected web section, and said web sections being formed with lines of weakening so that they will fold and bend in a manner to draw edges of adjacent gore sections into abutting relationship with the impressed matter on the gore sections in proper alignment after assembly and erection of the parts to form a globe.

5. A connecting and reinforcing web construction for interconnecting curved sheet gore elements of a globe, or like structure in edge abutting relationship, said web comprising a continuous intermediate flat strip of flexible material providing a connecting element between the curved edges of the sheet elements in spaced relationship before they are curved from a plane formation, said web extending from end to end of the gore elements said web strip adapted to be folded backward from the edges of the sheet elements which it connects and folded upon itself in a midway position between the edges of the sheet elements and extending laterally inward of the construction formed by the gore and web elements to thereby bring the sheet elements in edge abutting relationship, the web also being provided with weakened portions in the sides thereof permitting it to bend in a zigzag manner along diagonals alternately on opposite sides, whereby the curved edges of the sheets are brought into engagement and the sheets are curved concurrently and the sides of each of the webs are folded into engagement with each other with their bent portions in an interlocking formation between gores.

6. A connecting and reinforcing web construction in accordance with claim 5 wherein the sides of the web element are weakened to effect the bending in the sides at equal spaced intervals along the curved edges of sheets with which the web is connected for producing a circular construction web along the edges of the sheet when they are brought into edge abutting relationship.

7. A globe consisting of cooperating hemispheres, wherein each hemisphere includes a plurality of printed or otherwise impressed sections including, a polar section and a plurality of gore sections, an interior disk secured to and extending beyond the polar section to which the gore sections are secured with their end edges in edge-abutting relationship with respect to the edge of the polar section, connecting elements between the gore sections extending substantially throughout the longitudinal lengths thereof and inwardly of the hemisphere at all times for bringing the edges of adjacent gore sections into abutting relationship with the impressed matter thereon in alignment throughout the lengths of the gore sections when the hemi-

spheres are in their erected positions, and means between the ends of gore sections of the two hemispheres providing hinged interconnections between the cooperating gores of the two hemispheres at the equator of the globe.

8. A globe consisting of cooperating hemispheres, wherein each hemisphere includes a plurality of printed or otherwise impressed sections including, a polar section and a plurality of gore sections, means for securing the gore sections to the polar section in edge abutting relationship, comprising a disk element secured to the inner surface of the polar section with its edge extending therebeyond and to which the ends of the gore sections are secured so that their end edges abut the peripheral edge of the polar section, connecting elements between each of the gore sections extending from said disk element substantially throughout the longitudinal length of the gores for bringing the edges of adjacent gore sections into abutting relationship with the impressed matter thereon in alignment when the hemispheres are in their erected positions, and means between the ends of gore sections of the two hemispheres providing hinged interconnections between the cooperating gores of the two hemispheres at the equator of the globe.

9. A globe consisting of cooperating hemispheres, wherein each hemisphere includes a plurality of printed otherwise impressed sections including, a polar section and a plurality of gore sections, means for securing the gore sections to the polar section in edge abutting relationship, connecting elements between each of the gore sections extending substantially throughout the longitudinal lengths thereof and inwardly of the hemispherical elements at all times for bringing the edges of adjacent gore sections into abutting relationship with the impressed matter thereon in alignment when the hemispheres are in their erected positions, comprising web elements between the adjacent gore elements, said web elements being bent inwardly from the edges of the gore sections folded along a line midway between the gore sections and weakened at intervals to permit the web elements to curve as the hemispheres are erected, and means between the ends of gore sections of the two hemispheres providing hinged interconnections between the cooperating gores of the two hemispheres at the equator of the globe.

10. A globe consisting of cooperating hemispheres, wherein each hemisphere includes a plurality of printed or otherwise impressed sections including, a polar section and a plurality of gore sections, means for securing the gore sections to the polar section in edge abutting relationship, connecting elements between each of the gore sections extending substantially throughout the longitudinal lengths thereof and inwardly of the hemispherical elements at all times for bringing the edges of adjacent gore sections into abutting relationship with the impressed matter thereon in alignment when the hemispheres are in their erected positions, means extending beyond the polar section longitudinally and centrally of each gore section for cooperating with the connecting elements between the gore section in erecting the gore sections, and means between the ends of gore sections of the two hemispheres providing hinged interconnections between the cooperating gores of the two hemispheres at the equator of the globe.

11. In a geographical globe or the like wherein the hemispheres are formed of interconnected gore sections having hinged connections around the equator whereby the hemispheres may be collapsed to a folded substantially flat position with respect to each other, an axial socket secured in center of the upper hemisphere, a bored handle coaxially secured to the exterior of the lower hemisphere, an axis shaft adapted to be inserted through the bore of the handle and a coaxial perforation through the lower hemisphere and into the socket in the upper hemisphere, said axis shaft adapted to be inserted to an extent to erect the collapsed hemispheres into their fully erected positions, and a securing element cooperating between the shaft and lower hemisphere elements to maintain the hemispheres in their distended positions.

12. A printed form comprising a map or for constructing a globe hemisphere formation or the like, comprising a sheet upon which are impressed or printed hemispheric map sections including a polar section and separated gore sections in a predetermined serially spaced relationship with respect to each other, one only of said gore sections being continuous with the polar section at the time the sheet is printed.

13. A printed form comprising a map or for constructing a globe hemisphere formation or the like, comprising a sheet upon which are impressed or printed hemispheric map sections including a polar section and separated gore sections in a predetermined serially spaced relationship with respect to each other, one only of said gore sections being continuous with the polar section at the time the sheet is printed, and wherein the sheet material between the gore sections functions as a connecting means holding the gore sections in the determined serial relationship.

14. A printed form comprising a map or for constructing a globe hemisphere formation or the like, comprising a sheet upon which are impressed or printed hemispheric map sections including a polar section and separated gore sections in a predetermined serially spaced relationship with respect to each other, one only of said gore sections being continuous with the polar section at the time the sheet is printed, and wherein the sheet material between the gore sections constitutes a plurality of inwardly extending reinforcing and interlocking web elements between the gore sections throughout their lengths when the gore sections are fabricated into a hemispherical formation.

15. A globe of the character herein described wherein the globe formation includes gore sections of single thicknesses of flexible material such as paper, cardboard or other composition, interconnected by the material between them which is integrally continuous with the sections throughout their lengths and formed into interlocking and reinforcing interconnecting web elements securing the edges of the gore sections from end to end in edge-abutting relationship.

16. A connecting and reinforcing web construction for interconnecting curved sheet gore elements of a globe, or like structure in edge abutting relationship, said web comprising an intermediate flat strip of flexible material providing a continuous connecting element between the edges of the sheet elements in spaced relationship before they are curved and extending substantially from end to end of the sheet gore elements, said web strip extending laterally in-

ward of the sheet gore elements adapted to be folded backward from the edges of the sheet elements where it connects and folded upon itself in a midway position between the edges of the sheet elements to thereby bring the sheet elements in edge abutting relationship and the web also being so formed as to permit it to curve longitudinally following the curvature of the sheet elements as they are formed into their curved positions.

17. A connecting and reinforcing web construction for interconnecting curved sheet gore elements, of a globe, or like structure in edge abutting relationship, said web comprising an intermediate flat strip of flexible material providing a continuous connecting element between curved edges of the sheet element in spaced relationship before they are curved from a plane formation and extending substantially from end to end of the sheet gore elements, said web strip extending laterally inward of the sheet gore elements adapted to be folded backward from the edges of the sheet elements which it connects and folded upon itself in a midway position between the edges of the sheet elements to thereby bring the sheet elements in edge abutting relationship and the web also being so formed as to permit it to curve longitudinally following the curvature of the sheet elements as they are formed into their curved positions.

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