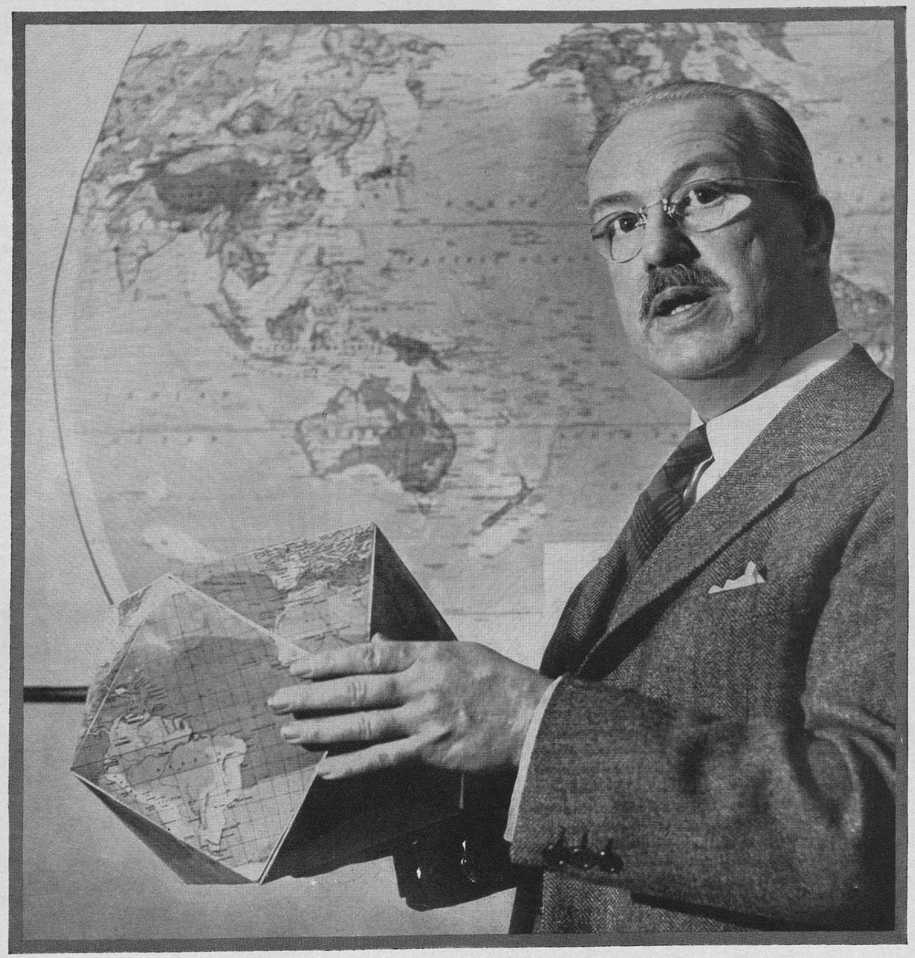
*Life Presents*

R. BUCKMINSTER FULLER'S

# DYMAXION WORLD



Printed on one side only of the two heavy center sheets of this issue of LIFE is a new kind of world map. It is a projection of the round earth on 14 flat segments, eight triangles and six squares. The map may be removed from the magazine and, in accordance with instructions on pages 44 and 53, cut out and assembled as a three-dimensional approximation of a globe or laid out as a flat map, with which the world may be fitted together and rearranged to illuminate special aspects of its geography.

As the Dymaxion World, this map bears the hallmark of R. Buckminster Fuller (*above*), engineer, who is now on the staff of the Board of Economic Warfare. Fuller's Dymaxion house (1927) and Dymaxion car (1933) figure in every constructive discussion of post-war shelter and transport. Fuller's Dymaxion World embodies his effort to resolve the dilemma of cartography: how to depict as a flat surface this spherical world, with true scale, true direction and correct configuration at one and the same time (LIFE, Aug. 3).

Orthodox cartography demands that the world be projected correctly in at least one of these aspects, even to the sacrifice of the other by distortion. This is a reasonable requirement in maps that are to be used for navigation, statistical work and other precise purposes. On his map, Mr. Fuller adjusts the requirements of scale, direction and shape in a compromise which distributes distortions evenly between them and around the globe. For the layman, engrossed in belated, war-taught lessons in geography, the Dymaxion World map is a means by which he can see the whole world fairly and all at once.

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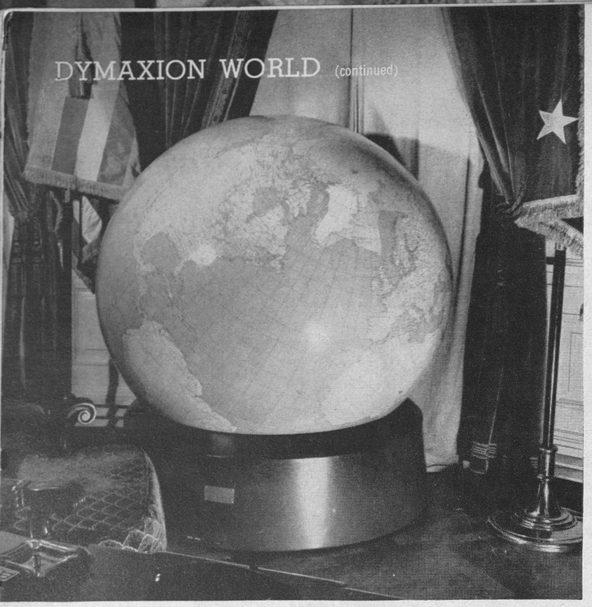
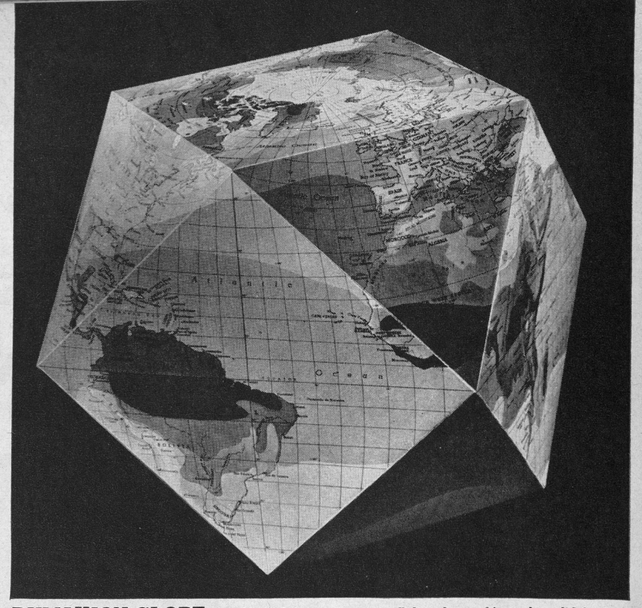


**PRESIDENT'S BIG GLOBE** rests in ball-bearing mount. It can be revolved in any direction and studied in the changing perspectives of war's strategy.



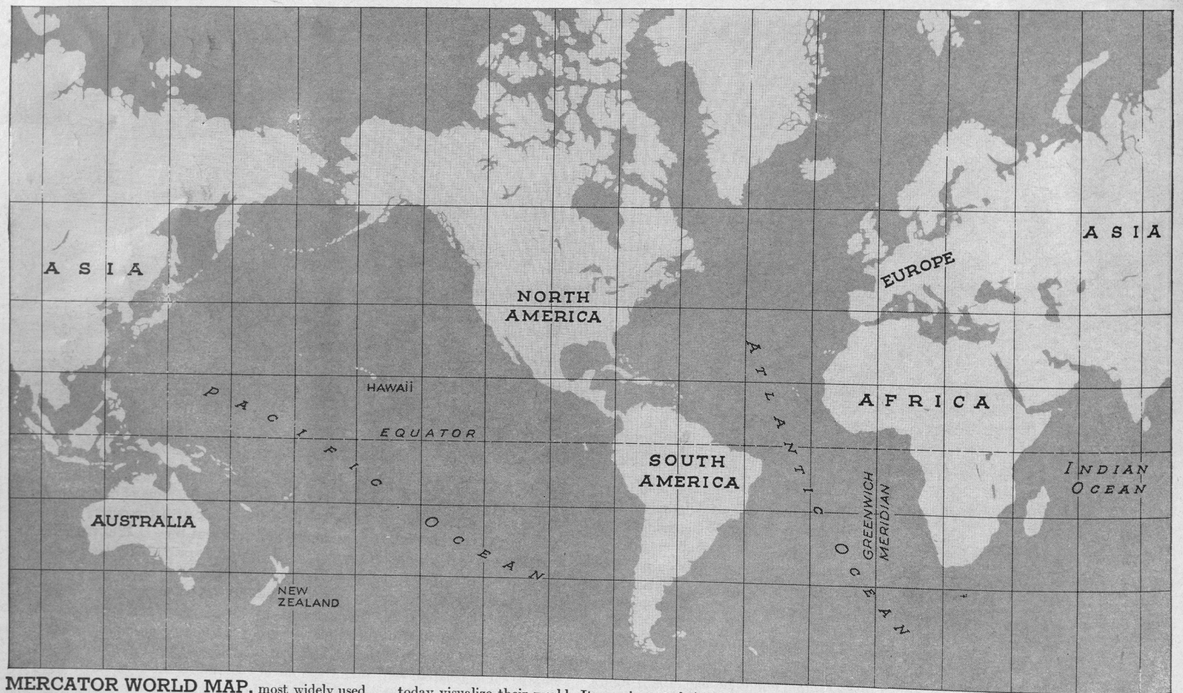
**DYMAXION GLOBE,** a cube with its corners cut off, has shape of irregular solid first constructed by Archimedes. Its scale, constant on edges of segments, is similar to that of a 12-in. globe.

# IT IS DESIGNED FOR POLITICAL GEOGRAPHERS

The President of the U. S. keeps a 50-in.-diameter globe close enough to his desk so that he need only swing his chair to consult it. As a political geographer, the President knows that no standard flat map can give him all the information he requires. The student—and master—of political geography is interested in the true, relative geographical locations of the Great Powers, and in the strategy of communications on the great-circle (shortest distance) routes between them. He must be able to visualize the world's geographical layout not only from his own vantage point, but in the divergent perspectives of other nations and their political geographers.

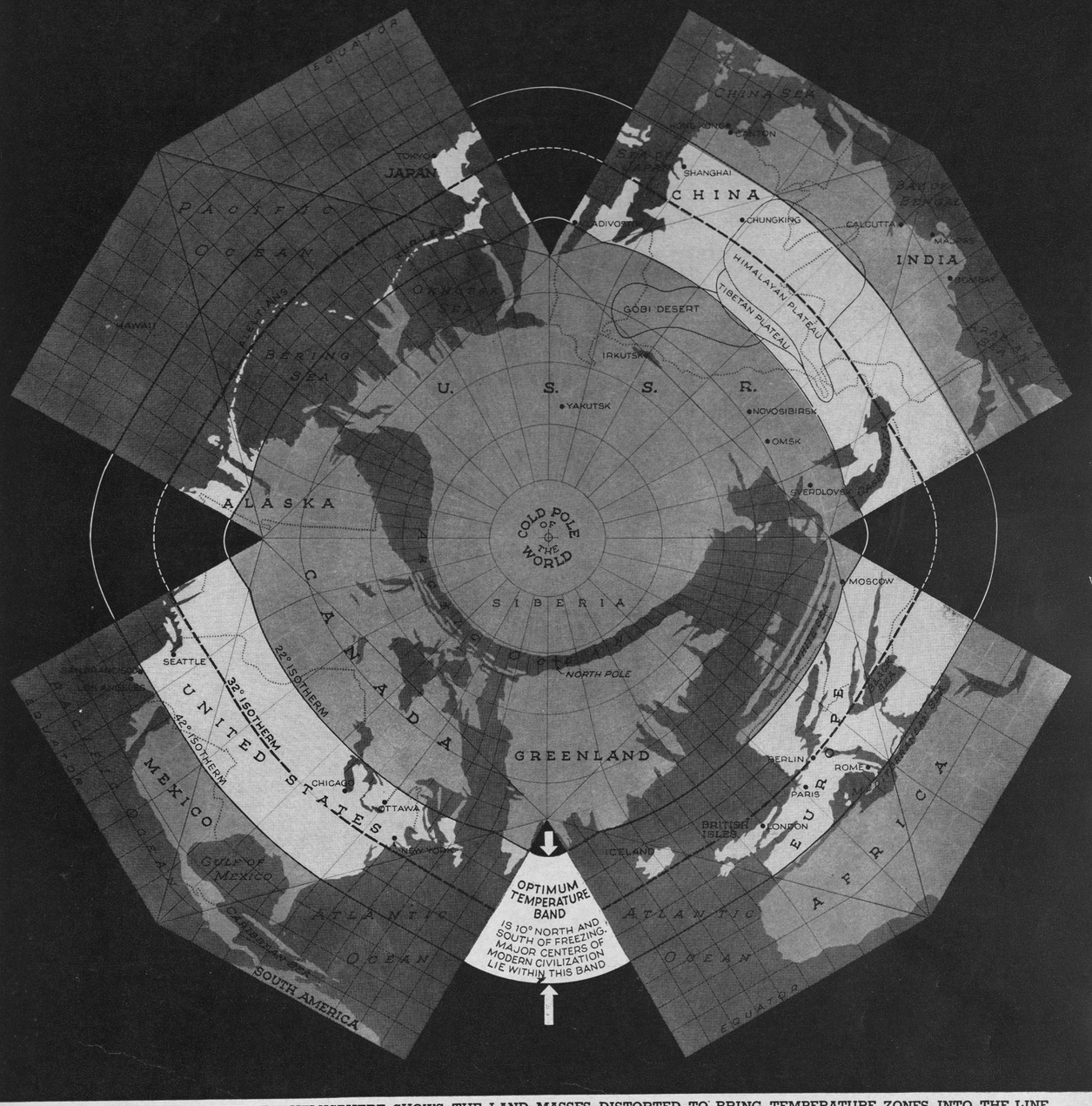
R. Buckminster Fuller designed his Dymaxion World map to fit exactly these requirements. Like all flat maps, it evidences the distortions that result from the translation of the three-dimensional surface of a sphere to a flat plane. Its distortions, however, are distributed proportionately within each of its 14 segments and are nowhere extreme. Greenland on the Dymaxion map appears close to its relative size, in contrast to its inflation to six times that size on the Mercator projection (*below*). The segments, plotted on an entirely novel grid of great circles, are constant in scale along their edges. Distortion increases toward the center of each segment.

Thus, though it does not easily yield precise calculations, the Dymaxion World, used as globe (*see above*) or flat map, satisfies the need, short of a perfect sphere, for a visually correct picture of the earth.




**MERCATOR WORLD MAP,** most widely used of all classical projections, is image in which most people today visualize their world. It was invented (1569) as a navigation chart with little regard for the relative size of land masses. As a picture of the 20th Century world it is misleading. It cannot show, for example, the North Pole.






**DYMAXION WORLD'S NORTHERN HEMISPHERE SHOWS THE LAND MASSES DISTORTED TO BRING TEMPERATURE ZONES INTO THE LINE**

# ZONES OF TEMPERATURE INFLUENCE HISTORY

The colors in which the Dymaxion World map is presented in this issue of LIFE define not the political boundaries or physical features but the temperature zones of the world. On this page the Northern Hemisphere of the Dymaxion World map has been subjected to systematic geographical distortion in order to line up the same temperature zones, or isotherms, and clarify their role in human geography.

Here the isotherms, which girdle the world in wandering, serpentine bands, have been smoothed into precise circles and have replaced the parallels of latitude. The familiar shorelines of the world have been distorted proportionately. The North Pole has moved southward and is supplanted by the −67° Cold Pole in Eastern Siberia. The white land belt defines the zone where average January temperature ranges from 22° to 42°.

The major centers of modern civilization lie within this belt. Here live 56% of the total human population. They control 84% of world's mechanical horsepower and, in consequence, dominate the territories and people outside. It is the optimum temperature zone for the well-being and efficiency of human beings.

The major course of human migration and history is east to west along the isotherms. People still think of the world in terms of Eastern and Western Hemispheres and separate continents. But history has also moved northward. Major U.S. and Russian industrial concentrations are north of the 32° line. The northern isothermic barrier of the Arctic region, across which lie shortest distances between east and west, is a split second's travel by radio wave, twelve hours by plane. The world is now one continent.

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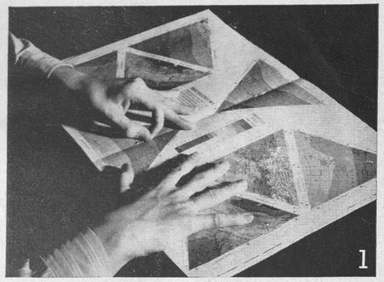
# HOW TO ASSEMBLE THE GLOBE

Here demonstrated is the simple procedure by which the segments of the Dymaxion World map are assembled into a visual approximation of a round globe. The opposite page is the reverse side of the second of the two heavy center sheets on which the map is printed.

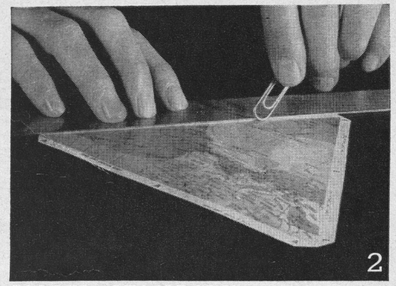
First step, removal of center sheets from magazine, must be taken with care to avoid tearing map on staples. Segments cut out are best fastened together by paste or mucilage. Because they warp the paper, pins should not be used. For neatest product, sequence of assembly here illustrated should be followed. Marginal letters of triangles match marginal letters of squares.

The map, thus assembled into a 14-faced solid, has many of the advantages of a globe. Like a globe it can be viewed from any perspective to bring geographical relationships into new relief—to show that the Southern is the water hemisphere, that Chicago and Sverdlovsk are fairly close together over the top of the world, that Dutch Harbor lies closer to the shortest San Francisco-Tokyo route than Pearl Harbor.

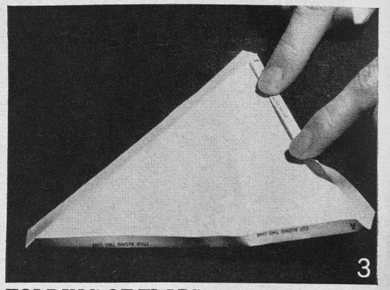
Before they are hidden inside globe, statistics on reverse of each segment are worth inspection. For example, the North Pole square's 8.9% of world population contrasts dramatically with the South Pole's .0004%.



**BENDING OF STAPLES** is first step in removing map from copy of LIFE. Bent back, staples hold copy intact.

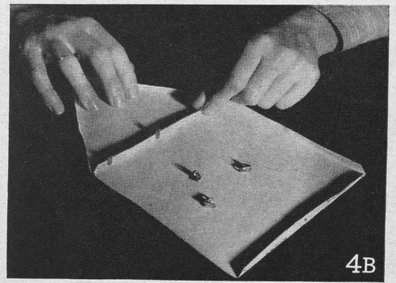


**SCORING OF MARGINS** of colored face of segment with clip or dull knife facilitates folding of flaps (*right*).



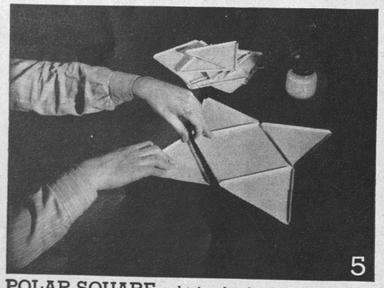
**FOLDING OF FLAPS** should follow margin of map precisely. Flaps of segments to be joined are keyed by letters.

**HOUSEHOLD PASTE** or mucilage is best means for fastening flaps. It should be spread thinly to avoid warping.

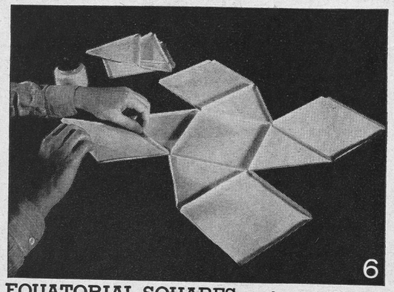


**PINCH CLIPS,** easy to apply, permit disassembly of globe. If clips are used last segment must be taped or glued in.

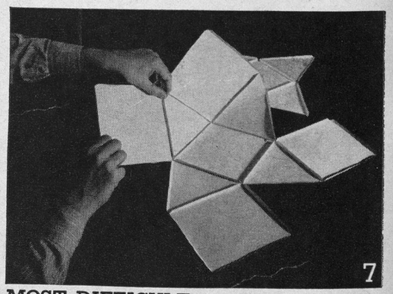
**CELLOPHANE TAPE** is substitute for paste and clips. It must be applied inside and out to keep edges together.



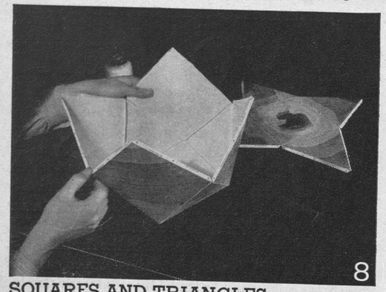
**POLAR SQUARE** and triangles should first be assembled into unit. Care should be taken to keep edges in register.



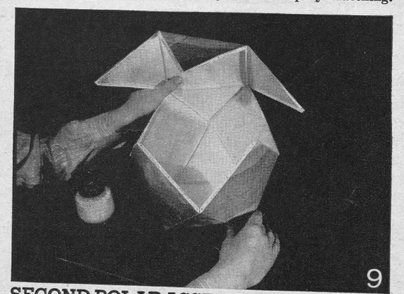
**EQUATORIAL SQUARES** are then joined to polar square-triangle assembly. Key letters simplify matching.



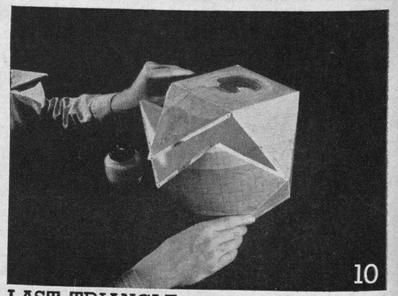
**MOST DIFFICULT** is this step in which square is joined to triangle. Polar square should be held flat on table.



**SQUARES AND TRIANGLES** are now fastened and structure is self-supporting. Paper has surprising rigidity.



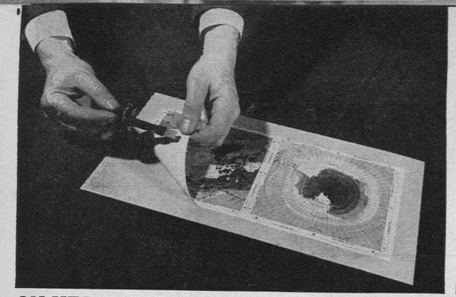
**SECOND POLAR ASSEMBLY** is mounted. Paste should be allowed to dry a little before the flaps are joined.



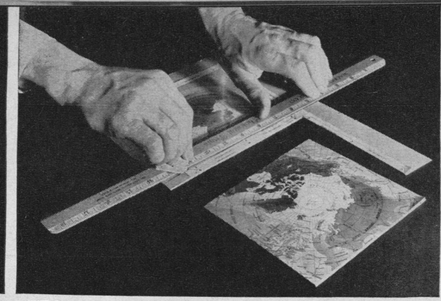
**LAST TRIANGLE** is left unfastened until other flaps are secured. It can then be set by pressure from the outside.

—OR YOU CAN USE SEGMENTS FOR A FLAT, MOVABLE MAP (SEE PAGE 53)

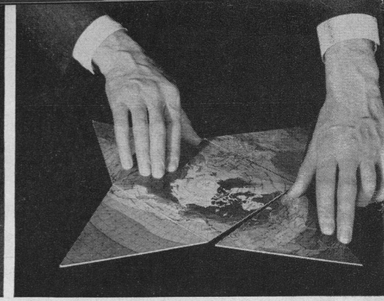




**ON HEAVY CARDBOARD,** the map is pasted or glued. Since paper is warped by moisture, paste should be applied thinly.



**SEGMENT IS TRIMMED,** after the glue or paste has dried sufficiently, with razor blade guided by a metal-edged ruler.



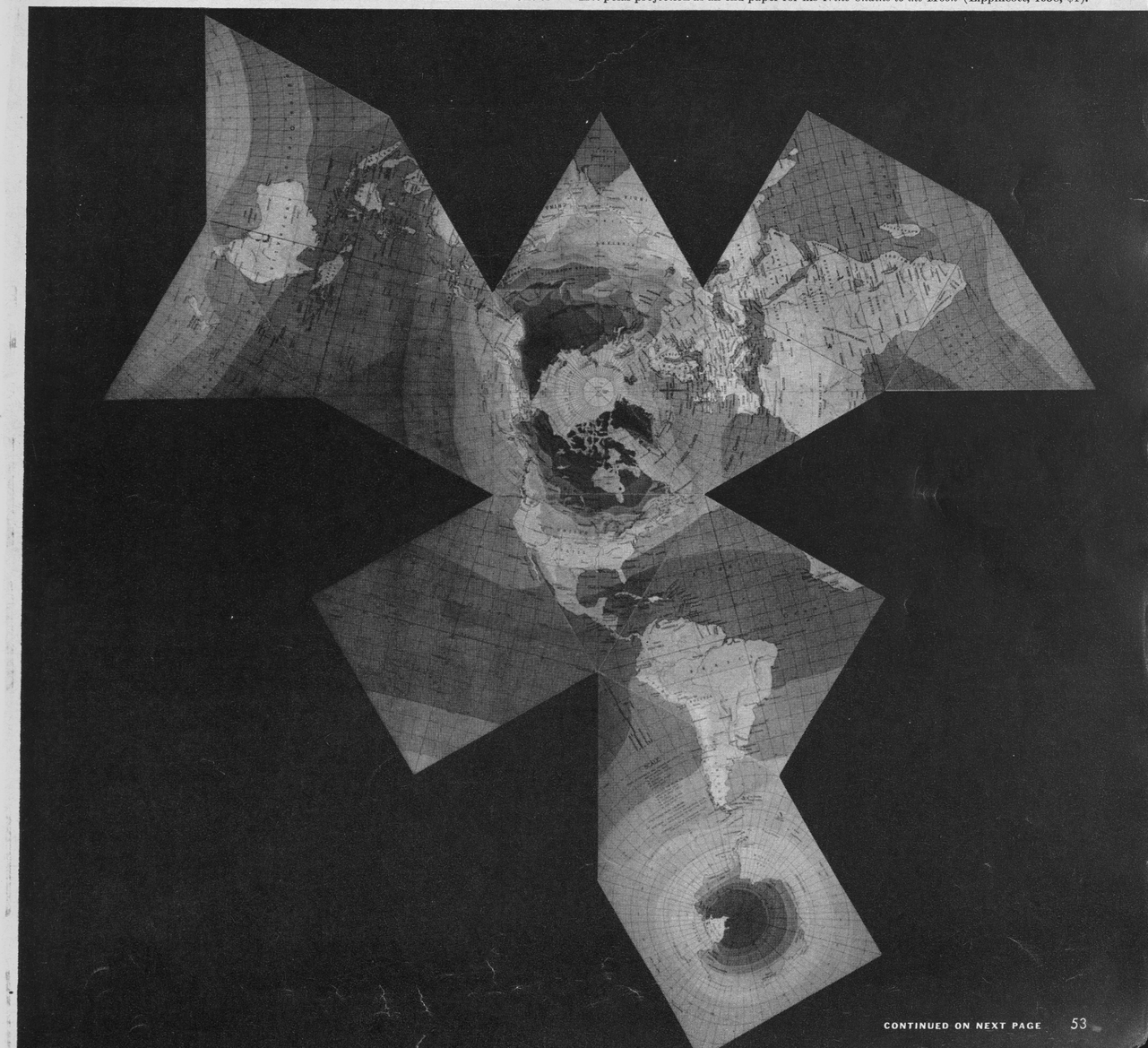
**MATCHING SEGMENTS** requires no deep knowledge of geography. Key letters help.

# FLAT MAP SHOWS WORLD IN MANY PERSPECTIVES

In its role as a flat map, the Dymaxion World holds fascination as endless as the possible combinations of its 14 segments. The segments should be mounted, as demonstrated above, on fairly stiff cardboard and trimmed smoothly with razor blade. This makes for easy handling and trim matching of edges.

Matched together, as below, the tiles can be arranged and rearranged (*see next page*) to animate the facts of geography and clarify many of its obscurities. The layout may be centered on any world power, and it will suggest at once the geographical considerations that dictate its strategy and ambitions. Thus the motivations of Jap imperialism and Argentine isolationism can be spread out for inspection, and the recent revolution in the U. S. world-view can be set down in graphic narrative.

**NORTH POLE LAYOUT** of segments shows the world in new focus of air power. The U. S., Canada and Russia control almost the whole coastline of the Arctic Ocean. One of the first to recognize the strategic importance of the Arctic region, Mr. Fuller designed his first polar projection as an end paper for his *Nine Chains to the Moon* (Lippincott, 1938, $4).



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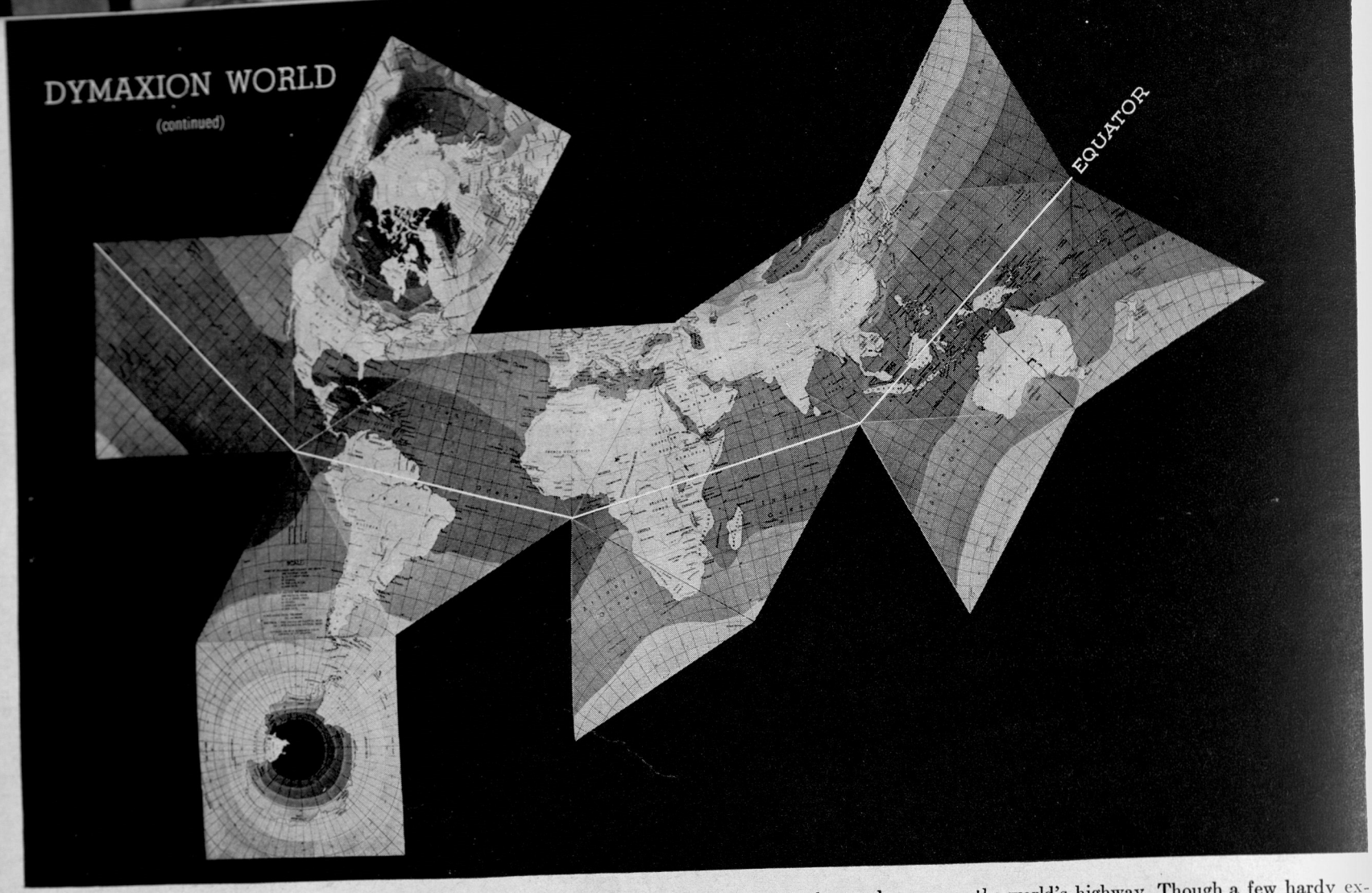



## MERCATOR WORLD

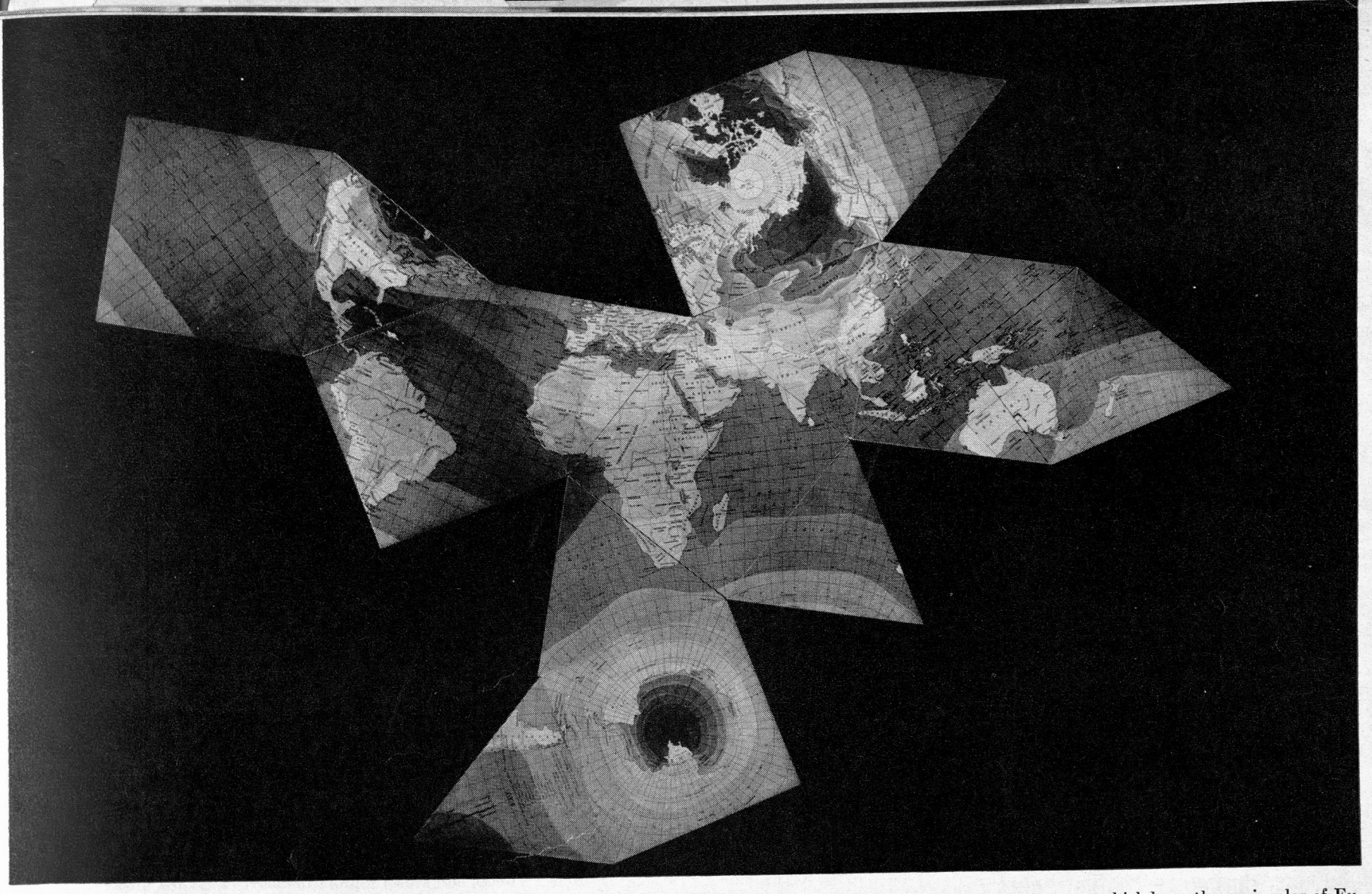
Here the tiles are laid in a pattern that approaches the familiar appearance of the Mercator projection. The equator is a continuous line, orienting the world east to west. Not shown on the true Mercator are the poles, which appear here. The Mercator is still the best and standard base map of navigation, but its perspective is that of the 16th, not the 20th Century.

This Dymaxion map approximation of the Mercator projection brings character of the Renaissance world into bold relief. Most striking is the vast expanse of ocean, the world's highway. Though a few hardy explorers hunted a Northwest Passage, the course of empire and trade was southward along the coast of South America and eastward around Good Hope into the Orient. It was in this period that the Dutch cartographers and Papal fiat divided the world in hemispheres.

## BRITISH EMPIRE

The British Empire was built by generations of mariners in the Royal Navy and merchant marine who knew not only ships but oceans. This layout of the Dymaxion map is not so much a picture of what they accomplished as it is a demonstration of how they did it. They found the secret to power where no one else thought to look—on the bottom of the world.

Due primarily to the rotation of the earth, the prevailing winds and ocean currents around the Antarctic region move from west to east, clockwise on the map. Sailing southward around Good Hope, British ships moved into the winds and currents as onto a turntable. From the turntable the waters opened out to the Indian peninsula, the Indies, the Pacific islands and the western coast of the Americas. Suez, after 1869, moved the lifeline northward through the Mediterranean Sea.



## HEARTLAND

Central Eurasia is the Heartland, the prize for which the German Army has once more marched against the world. It is a concept first expounded before World War I by a Britisher, Sir Halford Mackinder, who envisioned the decline of seapower before terrain-covering mechanized land armies. For land-bound Germany it was a ready-made program for World War II. The Nazis inflated it into something called "geopolitics," and set out to make it a terrible reality.

The world of geopolitics, as shown here, consists of one big continent on which hang the peninsulas of Europe and Africa. Australia, North America and South America are unimportant islands. The oceans, separate basins on map, lose strategic significance. "He who controls the Heartland controls the world," because he has outflanked seapower by capturing all its bases.

## JAP EMPIRE

The ruthless logic of the Jap imperialism is exposed by this layout of the Dymaxion World map. The seapower-minded Japs want nothing less than the Pacific. Control of the ocean and its shoreline, they calculate, will give them control of the hinterlands. Their thinking strikes an obvious contrast to the landlubber geopolitics of their German allies (*above*).

The Japanese can boast that they are closer to their goal than the Germans. Already they are masters of the western shores of the Pacific, from their northern toe hold in the Aleutians to their outposts in the Solomons. Consolidated there, they would be ready for the attack on North America as predicted by Ambassador Joseph C. Grew. On our side of the Pacific they saw foundations of their dream laid by colonies and trade on the U. S., Mexican and South American coastline.