The Geological Survey is making a geographic map of the United States, which necessitates the preparation of a topographic base map. The two main kinds together, in the form of four maps, the parts of which are called folios. Each folio consists of a topographic base map and geographic maps of a small area of country, together with explanatory and descriptive texts.

EXPLANATION

The topographic maps are of three kinds:
1. Contours define the forms of slopes. Since contours are continuous horizontal lines conforming to the surface of the ground, they wind their way about smooth surfaces and around great constricting angles of ravines, and project in passing about prominences. The relation of contour surfaces to the angles in forms and the magnitude of the feature of sufficient magnitude should be recognized. Contours should be used to guide the surveyor or owner who desires to ascertain the position or surroundings of property to be bought or sold; to show the engineer preliminary surveys in locating roads, railways, and irrigation ditches; to provide educational material for schools and houses; and to serve many of the purposes of a map for local reference.

2. Contours show the approximate grade of any slope. The vertical distance between two contours is the same, whether they lie along a cliff or on a gentle slope; but to rise a given height on a gentle slope one must go farther than on a steep slope, and therefore contours are far apart on gentle slopes and near together on steep ones.

3. Contour intervals are used to express elevation, the height of each contour above sea level. The heights of many points are accurately determined, and those which are most important are given on the map in figures. The contour interval is used; for a steep or mountainous region, a contour interval of 50 feet; for an intermediate and the largest of these. These intervals are used to express elevation, and to indicate their grade or degree of steepness. This horizontal outline, or contour, of all slopes, and to accommodate it the paper dimensions would need to be 1 mile to an inch.

Fig. 1-148. Sketch and corresponding contour map.

The sketch represents a river valley between two hills, with a terrace on the left and a flat area on the right. The height of the terrace is given by a broken blue line. Lakes, marshes, and other bodies of water are also shown in blue, by approximate conventional signs.

Uses of the topographic sheet.

The Geological Survey is making a geographic map of the United States, which necessitates the preparation of a topographic base map. The two main kinds together, in the form of four maps, the parts of which are called folios. Each folio consists of a topographic base map and geographic maps of a small area of country, together with explanatory and descriptive texts.

1. Contours define the forms of slopes. Since contours are continuous horizontal lines conforming to the surface of the ground, they wind their way about smooth surfaces and around great constricting angles of ravines, and project in passing about prominences. The relation of contour surfaces to the angles in forms and the magnitude of the feature of sufficient magnitude should be recognized. Contours should be used to guide the surveyor or owner who desires to ascertain the position or surroundings of property to be bought or sold; to show the engineer preliminary surveys in locating roads, railways, and irrigation ditches; to provide educational material for schools and houses; and to serve many of the purposes of a map for local reference.

2. Contours show the approximate grade of any slope. The vertical distance between two contours is the same, whether they lie along a cliff or on a gentle slope; but to rise a given height on a gentle slope one must go farther than on a steep slope, and therefore contours are far apart on gentle slopes and near together on steep ones.

3. Contour intervals are used to express elevation, the height of each contour above sea level. The heights of many points are accurately determined, and those which are most important are given on the map in figures. The contour interval is used; for a steep or mountainous region, a contour interval of 50 feet; for an intermediate and the largest of these. These intervals are used to express elevation, and to indicate their grade or degree of steepness. This horizontal outline, or contour, of all slopes, and to accommodate it the paper dimensions would need to be 1 mile to an inch.

Fig. 1-148. Sketch and corresponding contour map.

The sketch represents a river valley between two hills, with a terrace on the left and a flat area on the right. The height of the terrace is given by a broken blue line. Lakes, marshes, and other bodies of water are also shown in blue, by approximate conventional signs.

Uses of the topographic sheet.

The Geological Survey is making a geographic map of the United States, which necessitates the preparation of a topographic base map. The two main kinds together, in the form of four maps, the parts of which are called folios. Each folio consists of a topographic base map and geographic maps of a small area of country, together with explanatory and descriptive texts.

1. Contours define the forms of slopes. Since contours are continuous horizontal lines conforming to the surface of the ground, they wind their way about smooth surfaces and around great constricting angles of ravines, and project in passing about prominences. The relation of contour surfaces to the angles in forms and the magnitude of the feature of sufficient magnitude should be recognized. Contours should be used to guide the surveyor or owner who desires to ascertain the position or surroundings of property to be bought or sold; to show the engineer preliminary surveys in locating roads, railways, and irrigation ditches; to provide educational material for schools and houses; and to serve many of the purposes of a map for local reference.

2. Contours show the approximate grade of any slope. The vertical distance between two contours is the same, whether they lie along a cliff or on a gentle slope; but to rise a given height on a gentle slope one must go farther than on a steep slope, and therefore contours are far apart on gentle slopes and near together on steep ones.

3. Contour intervals are used to express elevation, the height of each contour above sea level. The heights of many points are accurately determined, and those which are most important are given on the map in figures. The contour interval is used; for a steep or mountainous region, a contour interval of 50 feet; for an intermediate and the largest of these. These intervals are used to express elevation, and to indicate their grade or degree of steepness. This horizontal outline, or contour, of all slopes, and to accommodate it the paper dimensions would need to be 1 mile to an inch.

Fig. 1-148. Sketch and corresponding contour map.

The sketch represents a river valley between two hills, with a terrace on the left and a flat area on the right. The height of the terrace is given by a broken blue line. Lakes, marshes, and other bodies of water are also shown in blue, by approximate conventional signs.

Uses of the topographic sheet.

The Geological Survey is making a geographic map of the United States, which necessitates the preparation of a topographic base map. The two main kinds together, in the form of four maps, the parts of which are called folios. Each folio consists of a topographic base map and geographic maps of a small area of country, together with explanatory and descriptive texts.

1. Contours define the forms of slopes. Since contours are continuous horizontal lines conforming to the surface of the ground, they wind their way about smooth surfaces and around great constricting angles of ravines, and project in passing about prominences. The relation of contour surfaces to the angles in forms and the magnitude of the feature of sufficient magnitude should be recognized. Contours should be used to guide the surveyor or owner who desires to ascertain the position or surroundings of property to be bought or sold; to show the engineer preliminary surveys in locating roads, railways, and irrigation ditches; to provide educational material for schools and houses; and to serve many of the purposes of a map for local reference.

2. Contours show the approximate grade of any slope. The vertical distance between two contours is the same, whether they lie along a cliff or on a gentle slope; but to rise a given height on a gentle slope one must go farther than on a steep slope, and therefore contours are far apart on gentle slopes and near together on steep ones.

3. Contour intervals are used to express elevation, the height of each contour above sea level. The heights of many points are accurately determined, and those which are most important are given on the map in figures. The contour interval is used; for a steep or mountainous region, a contour interval of 50 feet; for an intermediate and the largest of these. These intervals are used to express elevation, and to indicate their grade or degree of steepness. This horizontal outline, or contour, of all slopes, and to accommodate it the paper dimensions would need to be 1 mile to an inch.

Fig. 1-148. Sketch and corresponding contour map.

The sketch represents a river valley between two hills, with a terrace on the left and a flat area on the right. The height of the terrace is given by a broken blue line. Lakes, marshes, and other bodies of water are also shown in blue, by approximate conventional signs.

Uses of the topographic sheet.

The Geological Survey is making a geographic map of the United States, which necessitates the preparation of a topographic base map. The two main kinds together, in the form of four maps, the parts of which are called folios. Each folio consists of a topographic base map and geographic maps of a small area of country, together with explanatory and descriptive texts.

1. Contours define the forms of slopes. Since contours are continuous horizontal lines conforming to the surface of the ground, they wind their way about smooth surfaces and around great constricting angles of ravines, and project in passing about prominences. The relation of contour surfaces to the angles in forms and the magnitude of the feature of sufficient magnitude should be recognized. Contours should be used to guide the surveyor or owner who desires to ascertain the position or surroundings of property to be bought or sold; to show the engineer preliminary surveys in locating roads, railways, and irrigation ditches; to provide educational material for schools and houses; and to serve many of the purposes of a map for local reference.

2. Contours show the approximate grade of any slope. The vertical distance between two contours is the same, whether they lie along a cliff or on a gentle slope; but to rise a given height on a gentle slope one must go farther than on a steep slope, and therefore contours are far apart on gentle slopes and near together on steep ones.

3. Contour intervals are used to express elevation, the height of each contour above sea level. The heights of many points are accurately determined, and those which are most important are given on the map in figures. The contour interval is used; for a steep or mountainous region, a contour interval of 50 feet; for an intermediate and the largest of these. These intervals are used to express elevation, and to indicate their grade or degree of steepness. This horizontal outline, or contour, of all slopes, and to accommodate it the paper dimensions would need to be 1 mile to an inch.
replaced as beds or trains of sand and clay, the succeeding generation into similar deposits. Some of this glacial wash was deposited in trenches and channels in the ice, and forms characteristic ridges and mounds of sand and gravel, known as kames or eskers, and kame land. The material deposited by the ice is called glacial drift; that washed from the ice onto the adjacent land is called modified drift. It is usual also to class as surficial rocks the debris of the sea and the land which were made at the same time as the ice deposit.

AGES OF ROCKS.

Rocks are further distinguished according to their relative ages, for they were not formed at one time, but from age to age in the earth's history. Classification by age is independent of origin; igneous, sedimentary, and surficial rocks may be of the same age.

When the predominant material of a rock mass is essentially the same, and it is bounded by rocks of different materials, it is convenient to call the mass throughout its extent a formation, and such a formation is the unit of geologic mapping.

Several formations considered together are designated a system. The time taken for the deposition of a formation is called an epoch, and the time taken for that of a system, or some larger fraction of a system, is a period.

The rocks are mapped by formations, and the formations are classified into systems, periods, and epochs. The rock composing a system and the time taken for its deposition are given the same name, as, for instance, Cambrian system. Cambrian era. As sedimentary deposits or strata accumulate, the younger rocks those that are older, and the relative ages of the deposits may be discovered by observing their relative positions. This relationship holds true in regions of intense disturbance; sometimes in such regions the disturbance of the beds has been so great that their position is reversed, and it is often difficult to determine the relative ages of the beds from their positions; then fossils, or the remains of plants and animals, may guide to those of which two or more formations are the oldest.

Strata often contain the remains of plants and animals which lived in the sea or were washed into the sea. Rocks that contain the remains of life are called fossiliferous. By studying these remains, or fossils, it has been found that the species of each period of the earth's history have to a great extent differed from those of other periods. Only the simplest kinds of marine life existed when the oldest fossiliferous rocks were deposited. From time to time more complex kinds of life appeared, and the simpler ones lived on in modified forms life became more varied. But during each period there lived peculiar forms which exist in surface strata and have not existed since; these are characteristic types, and they define the age of any bed of strata. The age of a bed is being determined; the number and extent of similar formations, within the area toward which the ice advanced, is often difficult.

The figures of sandstones, forming the cliffs, and shales, containing the fossils, are the principal mineral mixed or of the stone, quartz, and feldspar. The most useful of the secondary minerals are mica, talc, and chlorite. Structures of rock—deposition. This exhibit shows relations of the formations beneath the surface. If we can cut through the strata and look at the rock, or can drill through them, we shall see the relations among the rocks beneath. The arrangement of rocks in the earth is the earth's structure, and a section exhibit- ing the relations of the formations beneath the surface. The kind of rock we are dealing with is a plaster quarry. The kind of rock we are dealing with is a plaster quarry. The kind of rock we are dealing with is a plaster quarry. The kind of rock we are dealing with is a plaster quarry. The kind of rock we are dealing with is a plaster quarry.
INFORMATION CONCERNING

TOPOGRAPHIC AND GEOLOGIC MAPS AND FOLIOS

AND OTHER PUBLICATIONS OF THE GEOLOGICAL SURVEY

CAN BE HAD ON APPLICATION TO

THE DIRECTOR, U. S. GEOLOGICAL SURVEY,

WASHINGTON, D. C.