relative position of the shaft, roads, and drifts, is to be shown in a diagram.

The inexperienced draughtsman may, in the first instance, make a drawing representing the roads, the same as on an ordinary ground plan, with the top of the pit (or hollow cylinder) at the point of intersection, by a scale, say of ten feet to one inch. He then, by the same scale, proceeds to lay down the shaft in a perpendicular line, and the south and west drifts in their relative position to the north and east roads.

Now the fallacy of such a figure as would thus be made is apparent; although many persons can correct, by their own actual knowledge of the true relation of the objects, any practical error as deduced from such a diagram; the knowledge of the designer may save him from the error of the drawing yet his diagram will convey no accurate idea to other persons.

We perceive, then, that every diagram must be designed in a certain relation to the truth, in order to convey correct ideas to others.

There are several methods of accomplishing this—

1. By a ground plan, or horizontal drawing.
2. By a sectional plan, or vertical drawing.
3. By an isometric projection.
4. By a parallel projection.

If the object to be designed or explained has relation only to one uniform plane surface, then the first of these modes is all that is required, but in every solid object the representation must depend on one or other of these methods of projection, unless perspective delineation is required. This does not come so much within the strict meaning of diagrams as generally understood, as of pictorial representation, which would introduce too wide a field for illustration in the compass of a lecture like this.

I consider diagrams, therefore, as being chiefly of such a nature as to require a close adherence to geometrical accuracy, and capable for the most part of being delineated by projection by parallel rays.

First.—On an horizontal plane, which, though it may be placed vertically, in order to be more clearly seen, is, nevertheless, so delineated as to represent a horizontal plane.

As, for example, a map of England, though placed upright against a school-room wall, is well understood to represent the nearly horizontal face of the country. Not so the geological sections or profile of railways to be found on some maps. These are to be delineated

Secondly.—By parallel projection on a vertical plane, and which, in like manner, is understood to be vertical, though lying flat on a table.

Both these models are especially meant to represent one surface only; if different surfaces are introduced, they are all laid down in separate drawings by the plain rules which regulate this method of delineation.

Thirdly.—When solid forms are to be delineated we may have recourse to isometrical drawing, which is best explained by reference to a cube, with a house and tower upon it; or

Fourthly.—By parallel projection, based on the theory of shadows, by which a principle is afforded for a mode of delineation of great practical value.

Such being the general principles or methods upon which diagrams may be conveniently constructed, we come now to a consideration of the objects capable of illustration, and this will be found to include a range so wide as to be almost co extensive with every department of human knowledge.

I shall first advert to number.—The most simple of all illustrations is that which represents a number by a space of length, and its relation to other numbers by lines of comparative length,—a method of teaching addition, subtraction, multiplication, and division, which ought to be in use in every school. A line, one inch long, is drawn to represent unity, and its extension to five, ten, or twenty times; the division into two, four, or more parts, are readily shown and made clear by a diagram. and this principle may be either applied by single lines or by bands of moderate breadth.

When the transition from one period to another is gradual, single lines, representing the time of observation, may be used; but when quantity or number is definite at separate periods, bands of moderate width are proper.

In this manner may be clearly shown the number of inhabitants in a town or parish, or in several, say ten or fifteen, towns;

The actual number of children at school;

The proper proportion according to age; and

The rate, above or below such proportion.

In the admirable diagrams of statistics prepared by the late Mr. Fletcher, the element of number is shown by intensity of shading; the useful application of such diagrams to physical geography is apparent on inspection.

A further application of diagrams of number may be made in relation to time, and I exhibit diagrams of simple and compound interest, showing the value of three and five per cent. at both these rates.

The accumulation of funds at the same rates, viz. the amount of one pound in forty years, and of one pound per annum in forty years, as also the present value of one pound payable from one to forty.

These diagrams are of great use in illustrating simple and compound interest.

Another general application of diagrams is to represent space in relation to area; for as to mere extension, that is only the repetition of number. In areas we have to deal with a different mode of progression, and the line three times the length of another is the index to an area or square of nine times. Thus the relative size of the school-room may be compared with one square yard, one rood, one acre, one square mile.

The relation of one square mile to one hundred square miles.

The relation of one hundred square miles to a county or kingdom.

The relative size of Canada, England, Scotland, and Ireland in squares.

This is easily done by taking the area in miles, the square root of which is the side of the proper square.

Then England or Great Britain may be made a scale of comparison for Europe, for land and water, and finally for the globe.

We may then proceed to represent the globe, and to illustrate its magnitude in comparison with that of the sun; and so, by a series of well-studied diagrams, carry the mind from magnitudes easily understood to those vast distances which can only be arrived at by steps of patient study, a process which is equally required in every department of art and science.

In considering area with reference to accurate divisions, we have to take into account the knowledge of scales, and to this the diagram No. 1, Surveying and Levelling, is especially directed, as shewing and explaining the use of a barometer in a school, and the construction of the Vernier scales.

Such exercises are a useful introduction to a study of the properties of air, its pressure, &c.: and are, moreover, useful manipulations—the very root of exact measurement, and of a habit of exact regard to dimensions.

One great use of diagrams is to accustom the eye to general points of information. I may here especially mention and strongly recommend, the excellent and cheap diagrams of the Working Men's Association, examples of which are on the walls of this exhibition, and ought to be very generally used in schools.

Children accustomed to draw simple forms acquire a facility which would soon enable them to multiply copies of good diagrams from copies sent to a district; and as a proof of this, I exhibit numerous examples of geometrical figures, drawn by scholars at Allenhead's school, after a few months' practice.

Schoolmasters might be paid a moderate price for such copies, according to their merit, and copies of diagrams may easily be made on tracing linen; by these and similar means no difficulty would exist as regards providing diagrams. What is most wanted is a due appreciation of their use and value on the part of conductors of schools. They may with advantage accompany almost every part of education, being available in the very outset of arithmetic to explain numeration and other rules; the copying of diagrams greatly tends to improve writing; they convey clear ideas of relative time, and show the combinations of number and time. They moreovor occupy the attention of children so as to develop a degree of attention; and a considerable acquaintance with astronomy, geology, and other sciences, may thus be made with a clearness and facility which, without such aid, cannot be attained.

It has been my wish, in the brief limits of this lecture, to direct attention to the greatly extended use of models and diagrams in general education. This subject is one which is scarcely at all understood in the great majority of the humbler class of schools. I have endeavored, by a few examples, to point out the useful aid which they afford to the teacher, the animation they impart to others in dry and uninteresting lessons, the awakening of new ideas in the mind, and the formation of correct habits of thought. All these show forth the value of such means of illustration in the school, but here their value only begins—for they establish, in the eye of the youthful student, an exact habit of observation which will be of the greatest use in every stage of life. Whether it be in the recreations of travel, in the pursuit of science or in following industrial occupations of any kind, however humble, scarcely a day can pass without affording some opportunity of applying the kind of knowledge which is thus imparted. In every department, from the complicated details of finance or other statistical conditions which claim the mind of the statesman, down to the occupations of the humblest artisan, well-constructed diagrams may be made the means of presenting, as it were, in one field of view —combinations and relations of numbers, value, or space, in relation to time or other conditions, in a way which cannot be done by mere figures or descriptions.

At no former time, or at no former place, could these considerations be more appropriately urged than in this institution, when, for the first time in the history of the world, an attempt is made to bring from different nations whatever tends to illustrate educational progress, and to present them in union with those which have been adopted in this country. A lesson of deep significance is thus afforded, for as surely