(No Model.)

A. W. McCURDY & F. H. WINES.

PRINTING BLOCK OR FORM.

No. 443,373. Patented Dec. 23, 1890.

Fig. 1.

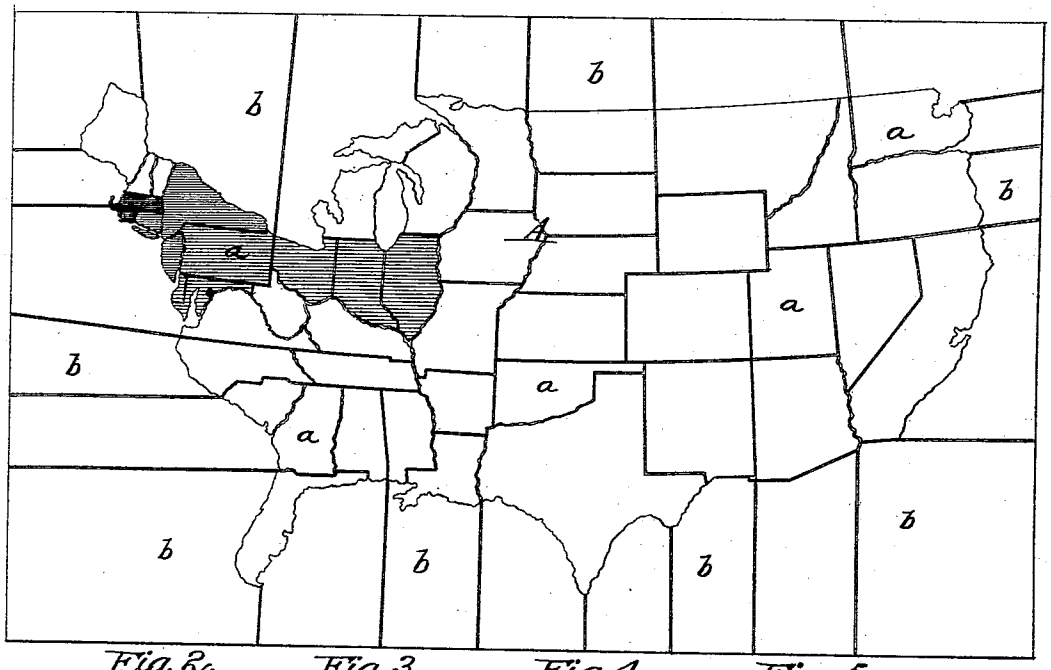


Fig. 2.

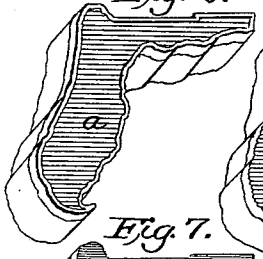


Fig. 3.

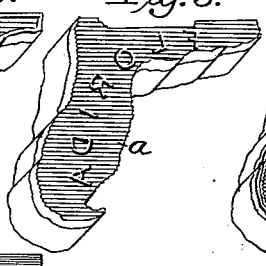


Fig. 4.

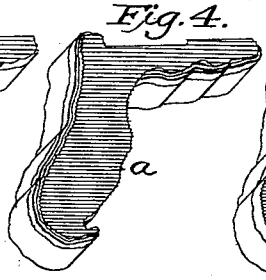


Fig. 5.

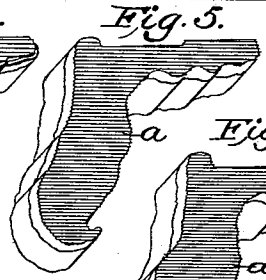


Fig. 6.

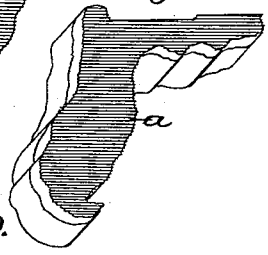


Fig. 7.

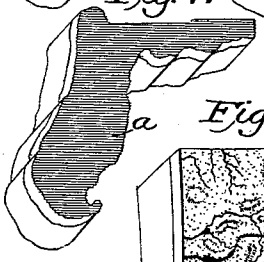


Fig. 8.

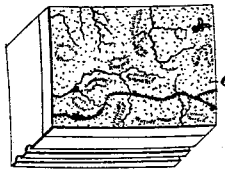


Fig. 9.

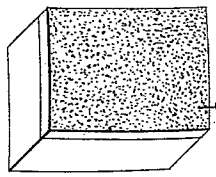


Fig. 10.

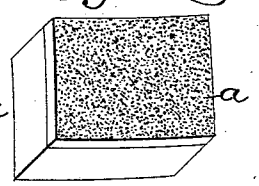


Fig. 11.

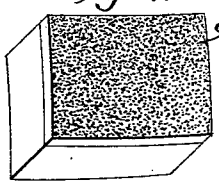
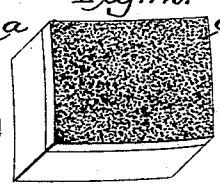


Fig. 12.



Witnesses:
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C. B. Bull

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Frederick H. Wines,
by Dodger Lowe,
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ARTHUR W. McCURDY AND FREDERICK H. WINES, OF WASHINGTON, DISTRICT OF COLUMBIA.

PRINTING BLOCK OR FORM.

SPECIFICATION forming part of Letters Patent No. 443,373, dated December 23, 1890.

Application filed June 10, 1890. Serial No. 354,872. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR W. McCURDY, a citizen of Nova Scotia and a subject of the Queen of Great Britain, and FREDERICK H. WINES, a citizen of the United States, both now residing at Washington city, in the District of Columbia, have invented certain new and useful Improvements in Printing Blocks or Forms, of which the following is a specification.

Our invention relates to the printing of maps, charts, &c., and more particularly such maps as are designed to convey graphically or apart from text information of a statistical nature; and it consists in a novel mode of producing, through the use of movable types of irregular outlines, certain effects which have not hitherto been produced otherwise than by engraving or lithographing.

Dissected maps have been produced by cutting printed maps into pieces by means of dies having outlines corresponding to the boundaries of political divisions. Printing or embossing type have been made, having upon their faces different sections of marks or lines found upon the faces of maps so drawn as to match at the corners. Colored maps have been printed from blocks having a portion of the surface cut away, and the portion not so cut has been engraved to represent lines, letters, or figures. Rectangular printing-blocks or blocks of other regular outlines and having a common unit of measurement have been provided with engraved faces, so that by combining a number of such blocks an ornamental background or groundwork might be produced. None of these plans, however, comprise the invention which we claim.

It has also been proposed to color maps through the use of a series of color-troughs each containing a movable plate covered with cloth or other elastic substance capable of absorbing coloring-matter, forcing the rims or boundaries of the troughs into contact with the map to be colored, and, finally, forcing the plates or stamps toward and against the face of the map, the non-printing rims or boundaries of the troughs being designed to prevent the colors from meeting and mingling.

The object which we have especially in view is the exhibition of mathematical or other relations or ratios existing between different sections of maps, charts, &c., corresponding to facts capable of such mathematical expression by shading or otherwise, and to accomplish this in an easy and simple but effective manner by the use of movable types, each of which constitutes an integral and unique portion of the entire design, so as to avoid the necessity of printing from blocks containing the whole of said design, thus reducing to a minimum the amount of engraving required to exhibit the aforesaid relations.

In exhibiting the results of a statistical inquiry relating to the population and resources of a country it is often found convenient or advisable to represent these results graphically upon a map or chart by coloring or shading different sections of the map according to an arbitrary and predetermined scale, so as to represent the different figures or ratios desired. For example, in a statistical map representing the density of population in the United States a certain color is or may be used to represent twenty-five inhabitants to the square mile, and other colors to indicate fifty, seventy-five, one hundred, or other number of inhabitants to the square mile, and so of other statistical matters. Such maps are commonly printed from lithograph-plates, as many plates being used as there are colors employed, each complete map being the product of as many impressions as there are colors and requiring for its production as many distinct lithograph-plates. By such process from five to ten lithograph-plates are required for the printing of each colored map, and these plates cannot be used for the printing of other maps. Moreover, the nicety of manipulation necessary to attain a perfect register of the different impressions renders the operation slow, difficult, and costly.

Another process in common use avoids distinctions of color, and the numbers, figures, or ratios are represented by an arbitrary system of shading, consisting of dots or parallel lines, closer or farther apart, or cross-hatching, the scale of shading being so arranged as to cause those sections of country having the

larger ratios or numbers to appear darker than the others, or vice versa. For this plan it is customary to employ engraved blocks or plates, each map being the product of a single engraved plate instead of being printed from several plates, as is the case where colors are employed; but this plate is useful only for the particular map intended and cannot be employed in the production of other maps or maps differently shaded or representing different ratios.

Our invention relates particularly to the printing of statistical maps from blocks or types, each having the shape of some determinate section of the country, such as a State or county or township, the face of each type being shaded by dots, parallel lines, cross-hatchings, or such other marks as may be used to designate numbers or ratios. The types so shaped are fitted together so as to constitute a dissected map-form in which the different determinate divisions are of a form and in a position the reverse of those which they are to occupy in the map to be printed from the dissected map-form or printing-form. In other words, the different sections of the map are composed of types, each a negative from which a positive may be printed, the different types being so shaded or marked on their faces as to represent the particular ratios or numbers desired, according to the scale of shading adopted. The dissected map-form so constituted is locked up in a printer's chase with quadrats of suitable shape and inked in the same manner as an ordinary printing-form. From this form a statistical map can be printed similar to that produced by the process of engraving. Each font of type or printing-blocks will comprise a series or group of blocks of each of the several forms to be represented in the design, the several blocks of each group being graded according to the predetermined scale or ratio and provided with lines or dots so spaced or arranged as to graphically indicate the intended ratio.

The method here proposed possesses many advantages over the processes in ordinary use, and results in a great saving of labor and expense in the production of statistical maps. It is unnecessary to employ skilled draftsmen, engravers, or lithographers in the preparation of the map, as an ordinary compositor can set up any desired statistical map from a suitable font of map-type. The labor involved in composing the complete map is less than that involved in setting up an equal page of printed matter. The type composing the dissected map-form can be redistributed and used again in the composition of other maps, so that a great saving of material is effected. Other advantages will readily suggest themselves to those familiar with such matters. While the bodies of the types are so shaped as to fit accurately together, it is not necessary that the faces of the type should fit so closely as to connect the lines of junction. A slight space between the edges of the faces may be advantageous, as the outlines of the States, counties, or townships represented by the type will then appear upon the printed map. So, too, a boundary-line for each State or indicated division may be produced upon the map by forming the blocks with a raised border or outline flush with and constituting a part of the printing-face.

The essential features of this portion of our invention consist in the use of printing blocks or types having the shapes of the different sections of the country and capable of being fitted together after the manner of a dissected map and in the employment of several sets or groups of types so shaped, each set or group having faces shaded to represent some number or ratio, according to a scale of shading determined upon. For example, most, if not all, of the statistical maps now produced by the process of engraving could be composed or set up by ten sets or groups of map-type, each group having a different shading, which we may designate by the numbers 1 to 10. If, then, it be desired to compose a statistical map of the United States of type each having the shape of some particular State or Territory, we should then require a set or group of type, the faces of each bearing shade No. 1, from which a dissected map-form of the United States could be composed, having the uniform shading No. 1, and another group or set of type with shading No. 2, from which could be constructed a complete map having a uniform shade No. 2, and so through the series. Ten sets or groups of type would then suffice to construct ten maps of the United States, each uniformly but differently shaded, from 1 to 10. As the types of each set or group are similarly shaped, they are interchangeable one with another, so that a complete map can be constructed from types selected from different sets or groups, and a statistical map can be produced in which the States and Territories are differently shaded, so as to indicate any numerical differences that can be represented by ten varieties of shading.

The nature of this portion of our invention and the manner in which it is reduced to practice will be more clearly understood by reference to the annexed diagrams, in which—

Figure 1 represents a face view of a form prepared for the printing of a statistical map of the United States, omitting Alaska. Figs. 2, 3, 4, 5, 6, and 7 represent perspective views of a series of printing blocks or types, all representing the State of Florida, but each belonging to a different set or group of map-type, the face of each being differently shaded or surfaced. Figs. 8 to 12 represent perspective views of printing blocks or types representing the Territory of Wyoming, the surfaces of said blocks or types being provided with raised printing-points to produce a dotted surface, the points being arranged closer on one block or type than on another.

In said drawings, A indicates a "form" composed of a series of printing blocks or types *a*, each having a face and body corresponding in outline with the outline of a State or Territory of the United States of America, so that when fitted together in their proper relative positions they produce a continuous printing-surface having the outline of the United States. These blocks or types are assembled in any convenient manner and are kept in their proper positions by a series of retaining-blocks or quadrats *b*, which, combined with the blocks *a*, complete the rectangular body A and adapt it to be "locked up" in an ordinary printer's chase. The printing-blocks *a* and the quadrats *b*, or either of them, may bear printing-lines or designs indicating rivers, lakes, mountains, and other formations, together with the names thereof, and of cities, towns, &c., or, in other words, may bear such matter as is customarily printed on maps and charts of this character, or they may bear only the shadings or gradations expressing the desired ratios.

Fig. 2 shows the block with its outer edge or boundary unbroken and "type high," so that the outline or boundary shall be printed as well as the shading lines or marks.

In Fig. 4 the edge is represented as cut away to form a shoulder, so that while the bodies of the printing-blocks fit closely together the edges of the printing-faces are slightly separated, thus leaving blank lines upon the printed map to represent the meeting points or boundaries of the different political divisions.

The map-type such as above described may also be used with advantage in the printing of colored maps. The method at present commonly adopted to produce such maps is, as before stated, the employment of and successive printing from a series of plates or lithograph-stones, each having a printing-surface coextensive and corresponding in form with the part or parts to be printed in one of the several colors to be used.

Under our method of printing colored maps the compositor will set up a map-form with the map-type, those sections of the map-form that have the same color being set up with type having printing-surfaces and the rest of the form being composed of quadrats or blanks having faces below the printing-surface, thus producing a form the printing-surface of which can be inked with a particular color, and from this form a map can be printed by one impression, showing all those sections of the map having such color. A map-form can be set up for each color desired, and the complete colored map will be a composite produced by a number of impressions, one for each color. This method is applicable not only to the production of ordinary colored maps, but also to the printing of statistical maps in which the different mathematical quantities are represented by different colors. It will be observed that where different colors are employed the lining or dotting of the surface need not be made use of, though it is feasible to employ both, and thus insure greater certainty of indication.

Under the plan first described—that is to say, with the surfaces of the blocks lined or dotted to produce different shadings—as many sets or groups of types will be required as there are mathematical quantities or ratios to be expressed, and the complete map will be printed by a single impression in ink of uniform color. Under the second plan—that is to say, the use of distinctive colors—a single set or group of map-type will suffice, and the complete map will be printed by as many different impressions in different-colored inks as there are different mathematical quantities or ratios to be printed. It is obvious that combinations of these two methods are possible, and in some cases might be advantageous by reducing the number of impressions and colors required. For example, different shades of blue might be produced by types having printing-surfaces in the form of dots, parallel lines, or cross-hatchings closer or farther apart, and all the different shades made by one inking. Thus the number of distinct impressions required could be reduced, each colored inking producing various sub-shades of color by the character of the markings upon the printing-surfaces of the types. It is also obvious that as the component type are movable it would be possible to ink each type separately with an ink of suitable color, in which case the complete colored map would be produced by one impression.

In the production of statistical maps it is sometimes desirable to exhibit, in addition to the statistical facts, details relating to the topographical features of the country, such as mountain-ranges, the courses of the principal rivers, &c., and to indicate also other details, such as the outlines of the political divisions of the country, with their names, and the position and names of the principal cities, &c. Those features of the map that are not of a statistical nature are mostly features that would be common to all the statistical maps that would be required relating to that section of the country. They may therefore be incorporated on an ordinary map-plate and printed upon all the statistical maps relating to that area of country and printed by a separate impression; but it is obvious that any desired details may be indicated upon the faces of our map-type in addition to the marking with reference to the mathematical quantity. For example, printed words, courses of rivers, &c., could be shown by depressed lines in the surfaces of the type, which would thus appear in white upon the printed map, and so of canals, railways, &c.

To facilitate the setting up of the type, they may be nicked, after the manner of ordinary type, as shown in Fig. 8.

It will readily be seen that the uses of such

printing types or forms may be extended to a variety of fields and subjects, and consequently while we have described our invention as applied to that particular field in which we deem it of most immediate and practical benefit we do not mean thereby to restrict ourselves to the printing of statistical maps. It is obvious, for instance, that the plan is applicable to the printing of railway-maps, in which case the blocks would or might be divided on lines other than those of political divisions, and to charts and other prints in which political divisions may not appear. For these reasons we wish it understood that the form represented in the drawings is merely illustrative of the general plan, and is not to be followed arbitrarily either as to the dividing-lines or as to the grading.

Hitherto it has been the practice, as we understand, to vary the spacing of lines or markings upon statistical maps, so as to produce different shades or tones, but not upon a definite and predetermined mathematical scale. We, however, preferably and ordinarily adopt a mathematical scale or ratio of increase of spacing, thickness, or weight of line or the like, so that there shall be not merely an apparent difference, liable to be differently valued or estimated by persons of differing eyesight, but a definite and mathematically-ascertained difference susceptible at all times of measurement and verification, if necessary.

Having thus described our invention, what we claim is—

1. Separable printing blocks or types adapted to fit together after the manner of a dissected map and bearing upon their faces markings representing mathematical quantities, substantially as herein shown and described.

2. Printing blocks or types having the shapes of political divisions of a country and adapted to fit together after the manner of a dissected map, substantially as herein shown and described.

3. A font of type comprising a series of blocks or types of irregular outlines corresponding to different determinate divisions of the complete map or chart to be printed and having rigid printing-faces.

4. The combination, with separable map-type having irregular outlines, as herein shown and described, of quadrats or blanks having outlines corresponding with those of the type and having faces below the general level of the printing-surface to facilitate the locking up of the type in an ordinary printer's chase.

5. The herein-described method of producing maps or charts, which consists in combining or fitting together a series of blocks or types of irregular outlines corresponding to different determinate divisions of the complete map and having rigid printing-faces, inking the form thus produced in the ordinary manner of inking a printing-form, and printing therefrom.

6. The herein-described method of producing statistical maps or charts, which consists in combining or fitting together a series of separable printing blocks or types, each having an outline corresponding to some political division of the complete map and each having a printing-surface graded or marked to indicate a definite ratio or value in the complete design.

7. The herein-described method of producing colored maps or charts, which consists in combining or fitting together separable map-types or printing-blocks or quadrats, each type having a rigid printing-face and an outline corresponding to some political division of the complete map, and thereby producing a printing-surface representing so much of the complete design as is to be printed in any one color.

8. The herein-described method of producing maps, which consists in combining or fitting together printing blocks or types having respectively the shapes of political divisions of the country represented and provided with rigid printing-faces, the blocks or types being fitted together after the manner of a dissected map, and printing from the form or composite block thus produced.

In witness whereof we hereunto set our hands in the presence of two witnesses.

ARTHUR W. McCURDY.
FREDK. H. WINES.

Witnesses:
C. S. DRURY,
W. W. DODGE.