

May 7, 1929.

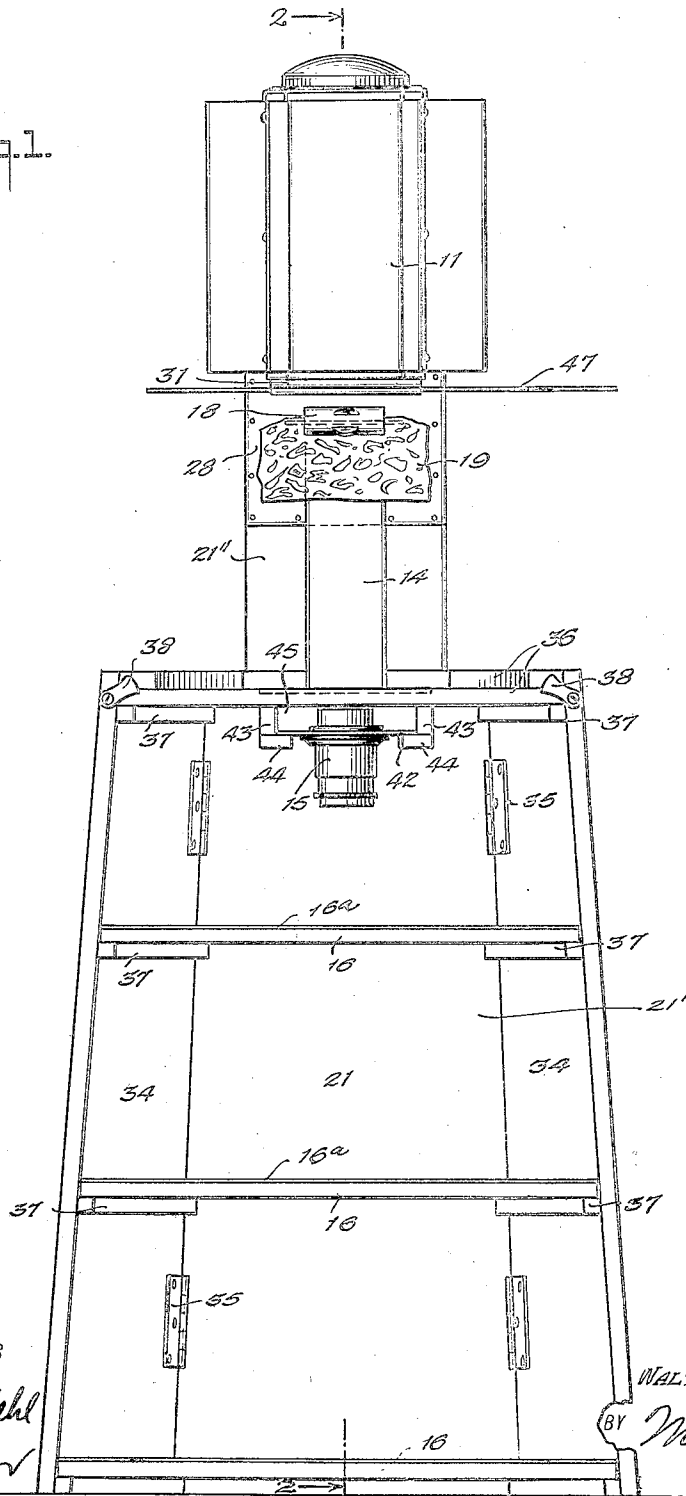
W. C. HADLEY

1,712,431

DESIGN GENERATION

Filed April 30, 1923

3 Sheets-Sheet 1



WITNESSES

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3 Sheets-Sheet 2

Fig. 2.

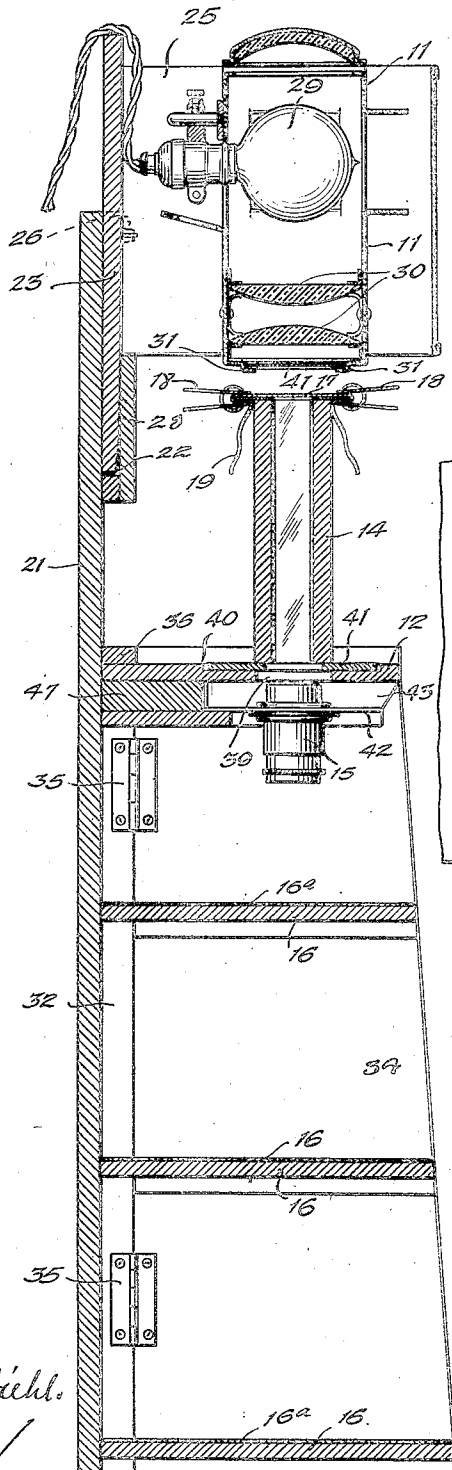


Fig. 3.

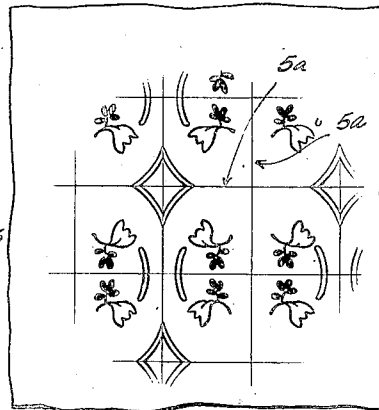


Fig. 11.



WITNESSES

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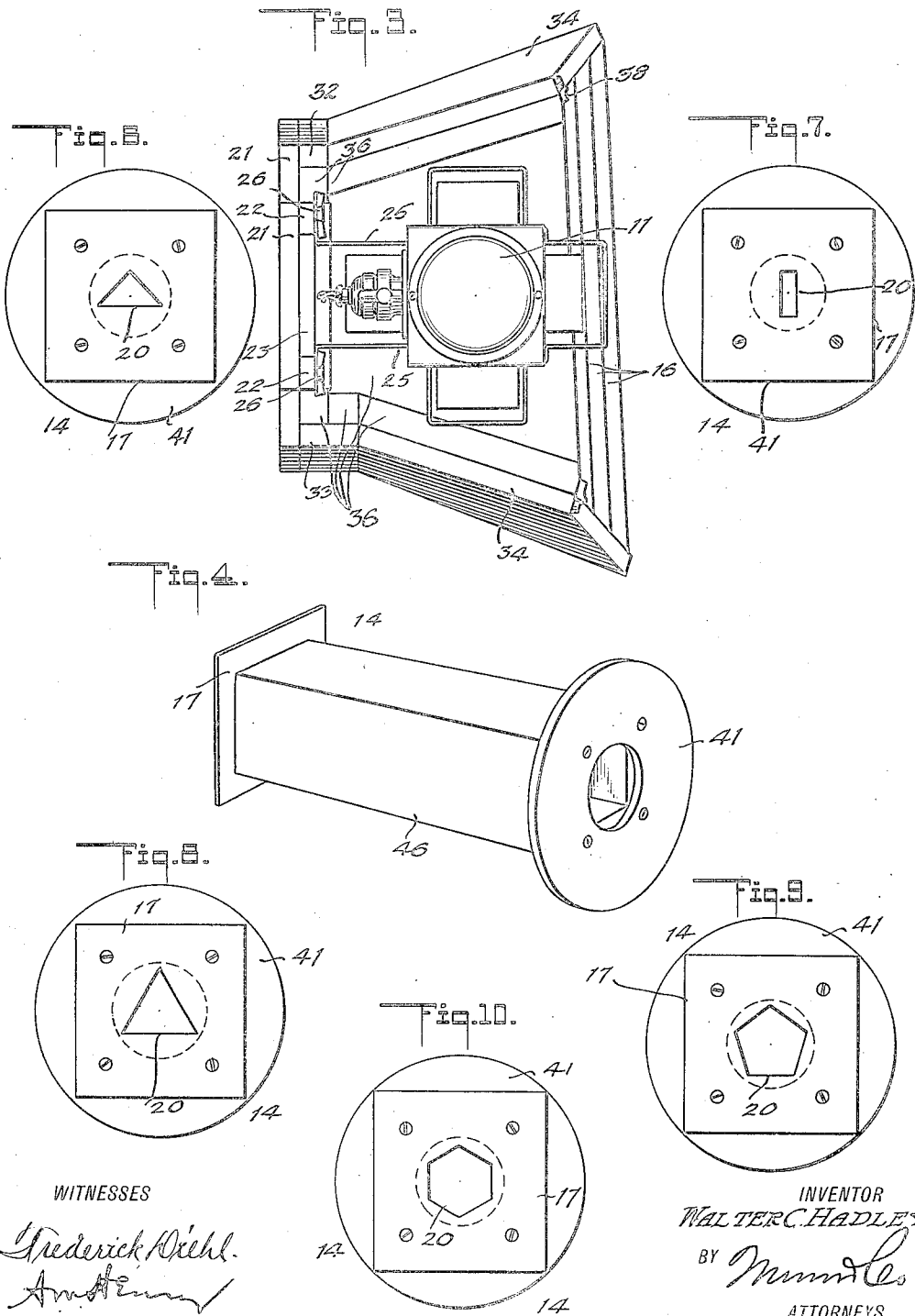
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DESIGN GENERATION

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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE.

WALTER C. HADLEY, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN PRINTING COMPANY, OF FALL RIVER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

DESIGN GENERATION.

Application filed April 30, 1923. Serial No. 635,689.

The present invention relates broadly to that class of optical instruments known as kaleidoscopes, and more particularly aims to provide an improved apparatus, useful in textile designing particularly, whereby various units of a design may be produced not only as suggestions for designs to be practically adopted, but whereby designs may be generated exactly as they will finally appear, except possibly for variations of color scheme, and may be preserved in what may be termed a design unit library for an indefinite time without having to render the apparatus idle or to wholly or even partially dismantle said apparatus until such time as said design element is transcribed by photography, an artist's pencil or otherwise, to a parchment or other record sheet capable of preservation.

The below discussion of the state of the prior art, as I am acquainted with it, and of the features of the present invention broadly distinguishing it from such prior art, together with the various advantages and objects of the present invention to be preliminarily discussed, will all be best understood if at this point a short description of the various figures of the drawings be interpolated.

In such drawings, which of course show, merely illustratively, one of the various possible embodiments of my new apparatus, designed particularly to facilitate carrying out the method also provided by my invention, Fig. 1 is a front elevation of said embodiment;

Fig. 2 is a vertical longitudinal section, taken on line 2—2 of Fig. 1;

Fig. 3 is a top plan view;

Fig. 4 is an enlarged perspective view of one of the instantaneously bodily removable kaleidoscope units;

Fig. 5 shows a design actually heretofore generated, and illustrates one example of the class of designs adapted to be generated by the four-reflector-type unit of Fig. 4, that is to say, designs in which the repeat elements are squares;

Fig. 6 is an end elevation of another type of such kaleidoscope unit, but one having three mirrors or prisms instead of the four mirrors or prisms of Fig. 4;

Fig. 7 is an end elevation of another type of unit similar to Fig. 4 but having its four mirrors or prisms conforming in cross section to an elongate rectangle; the unit of Fig. 7 is adapted to generate a design of

which the repeat elements are quadrangular, as in Fig. 5, but having the particularly unique and important characteristic that the design generated has been discovered to be most prolific of stripe effects, with the stripe components generally running transverse to the length of the elongate repeat element generated;

Fig. 8 is an end elevation of another type of unit, this unit being adapted to generate a design of which the repeat elements are equilateral triangles, also having a particularly unique and important characteristic as to the design generated, giving for the first time in this art, the type of design technically called "step one-half at the head";

Fig. 9 is an end elevation of another type of unit, this unit being adapted to generate a design of which the repeat elements are regular pentagons; and

Fig. 10 is an end elevation of still another type of unit, this unit being adapted to generate a design of which the repeat elements are regular hexagons.

Fig. 11 illustrates the mother sheet from which the design of Fig. 5 could be generated.

It will of course be understood that each of the kaleidoscopes disclosed in Figs. 4, and 6 to 10 inclusive, consists of a plurality of mirrors, the cross section of the mirrors of each kaleidoscope varying in accordance with the cross section of the several apertures (see Figs. 6 to 10 inclusive).

Referring now preliminarily to the main features of the apparatus of the drawings, it is seen that a lamp-house is indicated at 11, a shelf-like support is at 36 for supporting the lower end of a vertically disposed removable kaleidoscope unit 14 and also for supporting a lens 15, and a plurality of selectively individually utilizable projected-image-receiving surfaces each carried at the top of one of a plurality of vertically spaced horizontal shelves 16 near the bottom of the general vertical structure typical of the invention. The term "vertical" as herein employed is used in the approximate sense only, but with the idea of sharply defining the invention, in certain of its aspects, from horizontal projection-beam machines of the prior art.

For reasons which will appear hereinafter, such shelves will be herein referred to as the "tester screens".

In connection with unit 14, as one like any

of those in Figs. 6 to 10 or one otherwise constructed for reflecting design components to give even further different repeat elements for a design, there is further provided, by the present invention, an upper end structure 17 for the unit, here a square platform as shown in said Figs. 6 to 10, but preferably comprising an offset web of some suitable shape such that an auxiliary device, here a spring-clamp 18 of a long-known type in the stationery art, may be used to clamp in position a translucent sheet 19 (Fig. 2) of a flexible nature.

For reasons which will appear hereinafter, said sheet 19 (Fig. 2) will be referred to as the "design-generating instrumentality" or, more briefly, as the "mother sheet."

The mother sheet 19 (Fig. 2) is more clearly shown in Fig. 11, wherein the area indicated by the small square in the lower right hand corner of Fig. 11 is intended to be used in conjunction with a kaleidoscope tube having a square cross section (as shown in Fig. 4) to generate the design shown in Fig. 5.

I am well aware that my invention, so far as the same broadly utilizes a kaleidoscope component, is one of a numerous class of previously proposed machines; all such machines having the advantage that a great variety of combinations of designs may be obtained. These figures, although to a certain extent predetermined, are widely variable at will, yet very often of a fortuitous character in that the finally selected design is a slight deliberate variation of the main features of a design accidentally or empirically obtained.

I am also well aware that previous design-generating machines of the kind above indicated have been of the projecting type, that is to say, have included illuminating means for projecting an enlarged image of the design generated kaleidoscopically as above.

A very important object of the invention is to provide a design-generating apparatus of the type just characterized, but a comparatively inexpensive apparatus having none of the well-known defects of even the most costly of previous similar machines of the projection type. Of such well-known defects, probably the most important ones are the prohibitive expense of installing and operating such a machine, except possibly for the very largest textile mills, and the fact that once a satisfactory design is generated by the machine, the latter cannot be used again for the generation of another design until the repeat element of the first design is transcribed to a record sheet as above. The last-mentioned disadvantage prevails even in a very widely adopted foreign machine despite the fact that the latter has interposed in the path of its horizontal projection beam, a drum rotating on a horizontal axis eccentric to the center line of the beam and carrying a plurality of kaleidoscope units of different mirror or prism combinations and arranged parallel

to each other and parallel to the axis of the drum and spaced around a circle concentric with the drum axis, whereby the drum may be fractionally rotated to set one kaleidoscope or another in design-generating position relative to the light source creating the projection beam.

A further object of the invention is to provide a design-creating apparatus as aforesaid, and one particularly of a nature which may be constructed at a comparatively low expense also as aforesaid, and yet one wherein, as already indicated by the above reference to the main structural features of the drawing, the projection beam will be essentially vertical, as contradistinguished from the horizontal beam of the machine last described.

A further object is to provide a machine incidentally having the further advantage that the same may be continuously used, although during such period of continuous use incorporating only a single kaleidoscope, to create in quick succession a multiplicity of different designs each of which may be permanently preserved for transcription subsequently into permanent complete-design records, at leisure.

A further object is to provide a machine as above having the additional advantage that there is no need to incorporate a reflecting mirror, with all the familiar defects of the latter as to light losses and light-ray distortions, even to attain the result of always projecting the tentative design-images on a receiving screen located for convenient and satisfactory study of a multiplicity of such tentative designs during a prolonged session at the machine. It will probably at this point be understood, and certainly from what follows, that the important elimination of the reflecting mirror as last referred to, is one of the advantages naturally following my proposal to use a kaleidoscope-type design-projection machine wherein the light-beam is vertical rather than horizontal throughout its length.

A further object is to provide in such a vertical type apparatus, a combination of parts such that the single kaleidoscope element, hereinafter termed the tube, is one of a plurality of rotatable yet replaceable kaleidoscope units, one of which may be used, immediately upon removal from the apparatus, for making a truly instantaneous yet permanent record of the design registered by it a second before when in the machine, while another of said tubes is being used to discover another and a different design; thus not tying up the machine for long periods between the registering of each two acceptable designs, as would be the case where the machine itself comprised a receiving screen affording the only means of permanently recording a registered design by way of pho-

tographically or otherwise copying the design image on the screen. Indeed, the present machine is not tied up at all, between the taking of successive designs, especially since
 5 an important feature of the invention is the provision of means whereby each kaleidoscope tube is supported operatively by the machine (rotatably if desired) for design-creation solely by gravity. An essential feature of the present invention in this regard,
 10 further, is that any particular design registered is not intended to be copied immediately by the artist's pencil, or by some automatic recording means, as a camera, and, also, the permanent recording of any design
 15 of the present machine is in any event made not from the optical image of the design, but from the design itself.

To facilitate the attaining of the objects aforesaid, in a commercially practicable manner, the apparatus of the present invention has further characteristics, as brought out immediately below.

The new machine of the present invention, as will have been seen from the above short description of the drawings and preliminary reference to some of the essential elements of the illustrative apparatus of the invention, comprises a kaleidoscope projection machine wherein the lamp-house, by which is meant the housing or support for a source of illumination and desirably also for the condensers, is the uppermost element of a generally vertical structure, for directing the projection beam downwardly; wherein the
 35 lowermost element is a substantially horizontally-arranged image-receiving surface or "tester screen" 16, and wherein an intermediate element is a shelf 12 or the like having parts co-acting with parts on the various kaleidoscope tubes whereby one tube may be
 40 instantaneously substituted for another and thereupon be immediately effective, as the result of rotating the same if desired, relative to said shelf and also relative to the lens 15 preferably also carried by the shelf, for use in what may be termed "design-searching".

The new apparatus satisfies another object of the invention by taking advantage of its characteristic vertical structure, to provide an exceedingly simple, yet valuable means for further checking up and appraising the aesthetic value of any design generated, and at a minimum cost of time and effort. This results from the provision of
 50 not merely one, but a plurality of these tester-screens 16 below the lens, in such a way that each is adapted to be instantaneously substituted for another when desired, as by constructing said screens as slidable, individually removable shelves. Thus, assuming that two shelves 16 are provided, the lowermost one may be set to show the ornamental effect of a design of which the
 65 component configurations may be examined

on a rather large scale, and the uppermost one may be set to give the same ornamental effect but on a reduced scale and with a corresponding increase of definition. According as the search is for a design for say a
 70 textile fabric to have a large figured design, or is for a design for such a fabric to have a small figured design, the higher or lower shelf is employed first in general searching, and the other shelf is subsequently used for
 75 a more detailed and critical analysis of the design before final selection. The manner of making the proper focal changes in the lens, as one shelf is substituted for another, may obviously be performed with that celerity
 80 requisite to maintain the general speed of searching for and selecting a series of acceptable designs, characteristic of the present invention.

The invention has the further object of providing means, preferably associated with each individually and instantaneously removable kaleidoscope tube 14, and preferably a means involving a minimum of structure for the tube and including merely a single
 85 auxiliary device of practically inconsequential cost and already on the market for other purposes (as the spring-clip 18)—for permitting easy, absolutely accurate and dependable fixation on tube 14, of what has been termed
 90 the design-generating instrumentality or mother sheet 19. By such term mother sheet as hereinafter generally employed, is meant a strip or sheet-like member of translucent or transparent material having markings
 95 thereon such that shifting the member in its own plane and across the upper end of a tube 14 temporarily in the new machine, results in the generation of a succession of designs
 100 on the particular tester screen 16, at any time in position to receive the projected design image. And here results a further improved advantage of the invention, and one in which the vertical type machine characteristic thereof is deliberately provided in order to satisfy
 105 an object having such advantage in mind. This advantage is the fact that the mother sheet 19, while according to the invention preferably supported merely by gravity on the upper end structure of the tube 14, and to be shifted over such structure as just described, either by rotation, translation, or a combination of both such movements, nevertheless need not be a sheet-like member of a material having inherent stiffness, as paper,
 110 parchment, glass, celluloid, etc., but may be instead of flimsy and "floppy" material, as a clipping of a textile fabric of any printed or other optically projectable design. As a result, one textile design, say one generated,
 115 tested and found acceptable by the previous use of the apparatus of the present invention, may be used, as to some or all of its component configurations, to generate by way of the same machine a multiplicity of strikingly dissimi-
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lar designs for other textile fabrics; and a clipping from each of these latter may be used similarly in the same machine, and so on, ad infinitum.

5 The above-mentioned fixation means for a mother sheet 19 on a tube 14 of the present machine, when designed to have the advantages noted above in connection with the invention, preferably comprises in its entirety
10 merely (a) any floor-like structure or similar platform (as the platform 17) preferably permanently carried by the end of each tube 14 which is uppermost when the tube is set upright in the machine, (b) a polygonal opening
15 (as indicated at 20 in the case of the tube of Fig. 7), cut in said platform such that the sides of the same surround precisely the exact portion of the mother sheet 19 the image of which portion at any instant is being projected by way of said tube onto the tester
20 screen then effective in the machine, and (c) a preferably wholly removable preferably frictionally effective, auxiliary device for clamping a part of the mother sheet to a part of the
25 platform beyond said polygonal opening, so that while thereafter said instrumentality, due to its flexible or flimsy nature, may be disturbed in position, it may always be restored to proper position on the platform
30 when stretched relative to the grip of say one of the spring clips 18 of Fig. 2, either of which has been found completely satisfactory as an embodiment of said auxiliary device.

By means of the features foregoing, the
35 invention further provides a new and valuable means, or rather a method, whereby said portion of the mother sheet 19 surrounded by the polygonal opening, and constituting a repeat element of an acceptable design generated, may be permanently yet instantaneously inscribed, as with an ordinary pencil
40 in unskilled hands, with a valuable indicium. Such method merely involves the steps of stretching taut the mother sheet as above, then pressing a pencil point on the upper surface of the sheet and against a point on an edge of said polygonal opening and then advancing the pencil point against the sheet and along all the bounding edges of the
45 polygonal opening. Consequently, immediately after the making of such a polygonal inscription on the sheet the same may be removed from its tube 14 and stored away in a design-repeat-unit library, and said tube
50 may be immediately returned to the machine for the projection of another design. And, since the inscription of said indicium on the just-removed mother sheet has been actually found not to be projectable except most inconspicuously, this very same sheet may be
60 used again and again in the machine for the projection of another or other designs, before being sent to such library.

The invention has various other objects, as
65 will be seen later; these not only having to

do with the method aspect of the invention, but also having to do with the new apparatus provided. In the latter connection, for example, the invention aims to provide a design-
70 generating apparatus as aforesaid, and one which is not only of very inexpensive construction, as above, but further is adapted to be collapsed and, when collapsed, set up very easily and quickly and without the use of
75 special tools, or, indeed, any tools at all; an apparatus also, which is very light in total weight and is collapsible into a very small bulk, to facilitate transportation, particularly transportation from one part of a building
80 to another, as from the design-searching department to the office of a general executive.

Referring now more in detail to the apparatus of the drawings, the general vertical type structure provided includes a main
85 standard 21, desirably a length of wooden planking cut to provide a lower main portion with upwardly converging offset sides, such portion being designated at 21' in Fig. 1 and to provide a reduced upper portion marked
90 21'' in Fig. 1 and having parallel sides. This standard 21 at the upper end of its said portion 21'' carries a pair of vertical wooden strips 22 constituting rails for opposite sides of a slide board 23 supporting lamp-house 11.
95 This lamp-house 11 is preferably of a well-known type already on the market, as shown, and is made of light sheet metal and includes a pair of mounting leg extensions 25 having offset feet (shown only imperfectly in Fig. 3
100 of the drawings) by which the lamp-house is screwed or otherwise anchored on slide board 23. As shown best in Fig. 3, and as indicated in broken lines in Fig. 2, each rail 22 carries a clamp-screw 26 of the wing-nut-headed type which may be tightened up to clamp board 23
105 and hence lamp-house 11 at various elevations above that shown in Fig. 2. It will be noted that with slide board 23 at said elevation shown in Fig. 2, the bottom edge of the slide board falls just short of touching a cross-
110 block 27, and that about the lower third of the slide board is pocketed between about the lower halves of rails 22, said cross-block 27 and a cover board 28 nailed or otherwise secured to the block and the rails. The lamp-
115 house further includes, as shown best in Fig. 2, a lamp 29 of the electric-bulb type, a pair of condensers 30, and, below the condensers, slide guides 31.

Said standard 21 further forms a part
120 of a combined stand and cabinet, other parts of which stand and cabinet are as follows: The front face of lower portion 21' of standard 21 carries along opposite side edges offset panels 32 and 33 (Figs. 2 and 3), of which
125 the panel 33 is wider than the panel 32. Said combined stand and cabinet also includes a pair of side wing or wall members 34, hinged as indicated at 35 to said panels. And said combined stand and cabinet further includes
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a bodily removable platform 36 adapted to be set by gravity on the uppermost pair of ledges 37 carried by wings 34. Then, when the wings are spread as illustrated in the drawings, and platform 36 is set on the uppermost ledges 37, and a pair of pivoted friction-clamps 38 are swung as best shown in Fig. 1, said combined stand and cabinet is impositively yet reliably locked into form.

Platform 36, being provided with a circular opening as marked at 39 in Fig. 2, and having formed in its upper face concentric with said opening a circular recess 40 shown best in said Fig. 2, serves as the means for supporting the kaleidoscope tube 14 resting thereon solely by gravity. It will be noted that each tube 14 at its lower end (compare Figs. 6 to 10) preferably permanently carries a disk 41 to fit in recess 40; whereby the tube may be rotated by hand on platform 36 but always with its axis in line with the axis of lens 15 therebelow.

Said platform 36, further, carries a means for suspending said lens in such a way that while the lens may be readily adjusted for focus, the same, together with its mounting slide-plate 42, may be instantaneously bodily removed from the machine. It will be understood that by the term "lens" as hereinabove used may be meant the two telescoping tubes shown in Figs. 1 and 2 as well as the lens proper (not shown) fixed in one of the tubes. The parts carried by the uppermost platform 36 for thus suspending the lens 15 include a pair of wood blocks 43 nailed or otherwise secured to the bottom of the platform, and a pair of similar blocks 44 nailed to blocks 43, and arranged as shown best in Fig. 1, thereby to provide two L-shaped tracks for guiding plate 42 and suspending the lens by gravity by way of said plate. A stop-block 45 is provided on the bottom of platform 36 between rail blocks 43, as shown.

The pairs of ledges 37 on wings 34, below that pair of said ledges supporting platform 36 as just described, carry the horizontal shelves 16 the upper surfaces of which are suitably colored and may carry white or tinted paper covers 16^a for showing up as desired an image of the design generated when such image is projected thereon. Instead of such tinted and preferably interchangeable paper or other suitable covers 16^a, it is obvious that the covers may be white and a collection of translucent members of different colors may be provided for interchangeable interposition at a suitable point in the light-beam, as for checking up a design generated as affected by a desired dominant or general back-ground color-factor. Of course, in connection with such screens, the covers 16^a need not necessarily be white.

It will be seen from a comparison of Figs. 1, 2, 4 and 6 to 10 that each kaleidoscope tube 14 includes what may be termed its main re-

flecting-chamber-barrel 46, consisting of a plurality of mirrors positioned so as to provide a reflecting chamber indicated in cross section by the several openings 20 (see Figs. 4, and 6 to 10 inclusive), a disk 41 as aforesaid at one end, and a structure at the other end, as the square platform 17 aforesaid, including essentially a web offset from barrel 14. This web is provided to permit the employment of a spring-clip 18, or the like, as already described, to frictionally clamp a portion of the design-generating instrumentality or mother sheet 19, fixedly relative to the barrel 14, whenever an acceptable design, as that shown in Fig. 5, of which design the duplicate repeat elements are marked off by the light intersecting straight lines 5^a, is generated. As the parts are shown in Fig. 2, a pair of such clips 18 are shown clamping spaced points on a single mother sheet 19 to square platform 17 on the top of tube 14 then now temporarily in the machine; but very satisfactory results are obtained when only one such clip 18 is used.

Adverting to the slide-guides 31 carried at the bottom of the standard lamp-house 11 preferred to be used, these slide-guides may here advantageously be employed for mounting an endwisely movable slide 47 having a plurality of openings (not shown), in column and having translucent windows or panes of different degrees of relative opacity so that the slide member may be adjusted lengthwisely to give more or less intensity of illumination to the projection beam from lamp 29.

The apparatus has above been generally described in extended or working position. To collapse the machine, it is merely necessary, after removing the tube 14 then in the machine, after sliding out plate 42 mounting lens 15, after loosening the screws 26 and removing slide 23 with its lamp-house 11, after sliding out the shelves 16,—to release the clamps 38, lift platform 36 up and away, fold in the right-hand wall 34 of Fig. 1 against standard 21, and then fold in the other wall 34. In this connection, examining Fig. 3, it will be noted that panel 32 is of a width about equal to the sum of the thicknesses of a wall 35 and a ledge 37; and that panel 33 is of a width about equal to twice the width of panel 32. As a result, the two walls 34 are folded in close to and parallel with standard 21.

Reverting to the tubes of Fig. 4 and Figs. 6 to 10, there is of course no limit to the number of such tubes of different mirror or prism combinations which may be furnished. The prism or mirror combination of the tubes of Figs. 7 and 8 particularly; it may be said, are novel and important; the mirrors of the first conforming in cross section to an elongate rectangle, which constitutes a means for always creating stripe-effect designs from

practically any mother sheet; and the second constituting means for always creating what are known in the textile art as "step one-half at the head" designs, due to the reflecting chamber having a novel cross-section, that of an equilateral triangle, rather than of a scalene or isosceles triangle as heretofore. The practical importance of being always able at will surely to generate a series of stripe-effect designs, is obvious, from what is known even to those unskilled in the art of textile design; that is, as to the designs generated by the new tube of Fig. 7. As to the designs generated by the new tube of Fig. 8, it is pointed out that such designs are probably the most used of any in connection with the making up of printed fabrics. The provision of either of such tubes is per se an important feature of the invention.

The method of design searching afforded by the present invention, and facilitated by the apparatus above described, thus may be said broadly to involve the downward direction of a projection beam, while interposing a kaleidoscope unit in said beam so that a part of the beam traverses said unit from end to end, focussing the beam on a tester screen below the unit, and interposing in said beam and shifting therein a mother sheet substantially edgewise above the unit. Such sheet, the sheet 19 as above defined, is preferably supported solely by gravity on the upper end of the unit, that is to say, without other attachment or securement than by gravity and gravity-created friction, to the end, further, that the mother sheet may be released at any instant to permit gravity to hold the sheet quiescent on the upper end of the unit. A special feature of the present process, going back, however, to the fundamental concept of a projection beam extending away from a light source in a downward direction and at an angle more removed from the horizontal than from the vertical, is the employment of a mother sheet of substantially no inherent stiffness, that is, a sheet which is flexible but practically non-elastic. Thus the new method permits the use of a mother sheet of practically any material, provided only that the mother sheet has some degree of translucency; and further obviates the necessity of providing in any apparatus designed to facilitate a carrying out of the method, guiding grooves, slide-ways or the like for co-acting with the mother sheet when shifted transverse to the projection beam for design generation.

Further, the method provided by the present invention, preferably involves the marking of an indicium on the mother sheet, such that said indicium indicates a definite area of the mother sheet, with such area absolutely significant of the portion of the sheet to be hand-copied later to have such copy be a perfect repeat element of a previous and ac-

ceptable design generated by the method and found to be so acceptable by inspection of the projected image of a part of the mother sheet. As already explained, such indicium is preferably a polygonal outline established as by a pencil-line mark on a face of the mother sheet. It will be readily understood that once a mother sheet has received such a polygonal indicium or equivalent marking, an indefinite time may elapse before such sheet is delivered to an artist with instructions to make a hand-drawn copy of the repeat element of the design. Such instructions will also advise him whether the copying of said element is to be on the same scale as on the sheet or on a different scale, and the desired scale can be ascertained, for communication to him, very easily, by remounting the sheet on the tube which generated the design-repeat-element, and pursuant to the indication of said polygonal inscription or other marking aforesaid, and projecting the design image on a tester screen 16 at the proper height to obtain a satisfactory scale—if the ascertainment of such scale was not done at the same time the design was first generated and found acceptable. And by a similar method of procedure, a previously developed and accepted design may be again later projected to check up the recollection of its aesthetic appeal when first developed. A further important point: Imagine that a duplicate collection of the inexpensive bodily removable kaleidoscope tubes is retained at the mill where an official is located who is to pass finally on a design tentatively accepted at the main offices of the company in a distant city. The mother sheet with its pencil-marked or otherwise located design-creating area indicated according to the invention, has only to be mailed to the mill, for temporary attachment properly to the appropriate tube, and a glance through the tube, held to the eye and directed toward the light, is all that is required for the final judgment of said official.

The method also preferably involves the temporary securement of the mother sheet to the kaleidoscope unit then forming with said sheet a pair of optical interponents, whereby said unit and sheet may be removed from the machine and instantaneously restored to their relative positions when just before a satisfactory design was generated; thus to permit easy marking of the mother sheet as explained in the preceding paragraph. Otherwise stated, this feature of the new method preferably involves shifting the mother sheet substantially edgewise and transverse to the projection beam over the upper end of the kaleidoscope unit in the beam until the image of a suitable design is observed, then clamping a part of the sheet fixedly to a part of the unit, then stretching the sheet taut in a plane perpendicular to the

optical axis of the unit and thereupon marking the mother sheet to indicate the area thereof which generated such accepted design.

It will be seen, further, that the new method as just described is facilitated by the provision not only of bodily removable and individually replaceable kaleidoscope units, but the permanent mounting on the upper end of each such unit of a structure shaped to provide a plurality of permanently carried devices for serving as a means in aid of marking a polygonal or other suitable indicium on the sheet. Such permanently carried devices may be variously embodied, obviously; an example thereof being the above-described light entrance opening marked 20 in Figs. 6 to 10.

Finally, it will be seen that the new method may also involve rotating any kaleidoscope unit then in the projection beam about its own axis, either while holding the mother sheet fixed, or while also shifting the mother sheet, further to vary the designs generated; this advantage following from the fact that the method, as preferably carried out, involves as aforesaid the use of an individual-type kaleidoscope unit instantaneously insertable into and removable from the projection beam.

Inasmuch as many changes could be made in the above construction, and many apparently widely different embodiments of my invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It will also be understood that the language used in the following claims is intended to cover all generic and specific features of the invention herein described and all statements of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. The method of kaleidoscopic design-generation by projection which involves providing a projection beam, interposing a kaleidoscope unit in said beam so that a part of the beam traverses said unit from end to end, and, with said beam focussed to present an observable image of the design projected through the unit from the mother sheet next-mentioned, providing such a mother sheet and shifting the same substantially edgewise transverse to the beam variously until an image of a suitable design is so observed, and then clamping a part of the mother sheet fixedly to a permanently carried part of the unit, and then removing the unit and clamped mother sheet from coaction with the projection beam.

2. In a kaleidoscope design generating apparatus, the combination with a machine for projecting images of designs generated by a kaleidoscope unit from a mother sheet;

of a plurality of interchangeable and instantaneously removable kaleidoscope units, an auxiliary clamping device, and an instantaneously removable mother sheet, each unit including means for guiding the mother sheet during movement of the latter relative to the unit and for coacting with said auxiliary device to clamp the mother sheet to the unit.

3. As a new article of manufacture, a bodily removable optical interponent for kaleidoscopic design-generating apparatus of the projection type, comprising a kaleidoscope tube carrying at one end a structure against which a flimsy mother sheet may be held substantially flat opposite and beyond the light entrance to the reflecting chamber of the tube, said structure being shaped to provide a plurality of permanently carried devices for serving as a means in aid of marking an indicium on the sheet indicative of the area on the sheet then in position to be reflected in said chamber.

4. As a new article of manufacture, a bodily removable optical interponent for kaleidoscopic design-generating apparatus of the projection type, comprising a kaleidoscope unit carrying at one end a structure against which a flimsy mother sheet may be held substantially flat opposite and beyond the light entrance to the reflecting chamber of the tube, said structure being shaped to provide a plurality of converging edges for serving as a means in aid of marking an indicium on the sheet indicative of the area on the sheet then in position to be reflected in said chamber.

5. The combination with a projecting apparatus for displaying images; of means for generating the image of a stripe-like design, comprising a series of mirrors arranged in tubular form of uniform cross section, the cross section of the tube defining an elongate rectangle.

6. The method of selecting the basic element of a design which consists in placing a mother sheet bearing various characters adjacent to one end of a kaleidoscope unit, of placing a screen adjacent to the other end of said unit, of illuminating said mother sheet to kaleidoscopically generate a design in the kaleidoscope unit, of focusing the image of the design thus generated upon said screen, of varying the position of the mother sheet with respect to the kaleidoscope unit while observing upon the screen the image of each design generated until a satisfactory design is obtained, and of indicating upon the mother sheet that portion thereof which was used as the basis of the selected design and the identifying characteristics of the kaleidoscope unit employed.

7. The method of selecting the basic element of a design which consists in placing a mother sheet bearing various characters adjacent to one end of a kaleidoscope unit, of

placing a screen adjacent to the other end of said unit, of illuminating said mother sheet to kaleidoscopically generate a design in the kaleidoscope unit, of focusing the image of the design thus generated upon said screen, of varying the position of the mother sheet with respect to the kaleidoscope unit while observing upon the screen the image of each design generated until a satisfactory design is obtained, of securing the mother sheet in position with respect to the kaleidoscope unit, and of indicating upon the mother sheet that portion thereof which was used as the basis of the selected design and the identifying characteristics of the kaleidoscope unit employed.

8. The method of selecting the basic element of a design which consists in directing a light beam through a kaleidoscope unit onto a screen, of interposing a translucent element bearing various characters in the beam between the light source and the kaleidoscope unit, of focusing the beam to project the image of the design kaleidoscopically generated upon the screen, of moving the translucent element while observing the image of each design kaleidoscopically generated upon the screen until the image of a satisfactory design is obtained, and of indicating upon the translucent element the boundaries of that portion thereof which was utilized in conjunction with the kaleidoscope unit for generating the preferred design and the identifying characteristics of the kaleidoscope unit employed.

9. The method of selecting the basic element of a design which consists in directing a light beam upon a screen, of interposing a kaleidoscope unit between the light source and the screen, of interposing a translucent element bearing various characters or symbols in the beam between the light source and the kaleidoscope unit, of focusing the beam to project the image of the design kaleidoscopically generated upon the screen, of moving the translucent element while observing the image of each design thus kaleidoscopically generated upon the screen until a preferred design is obtained, of securely associating the translucent element in position with respect to the kaleidoscope unit, and of indicating upon the translucent element the boundaries of that portion thereof which was used in conjunction with the kaleidoscope unit for generating the preferred design and the identifying characteristics of the kaleidoscope unit employed.

10. The method of selecting the basic element of a design which consists in directing a light beam upon a screen, of interposing a kaleidoscope unit between the light source and the screen, of interposing a translucent element bearing various characters or symbols in the beam between the light source and the kaleidoscope unit, of focusing the beam

to project the image of the design kaleidoscopically generated upon the screen, of moving the translucent element while observing the image of each design thus kaleidoscopically generated upon the screen until a preferred design is obtained, of securely associating the translucent element in position with respect to the kaleidoscope unit, of bodily removing the translucent element and kaleidoscope unit from the light beam, and of indicating upon the translucent element the boundaries of that portion thereof which was used in conjunction with the kaleidoscope unit for generating the preferred design and the identifying characteristics of the kaleidoscope unit employed.

11. The method of reproducing a kaleidoscopically generated design which consists in immovably fixing the mother sheet and kaleidoscopic generator with respect to each other after a design so generated has been selected; of marking the mother sheet while thus fixed, to indicate the relative positions of the mother sheet and the kaleidoscopic generator, and to distinguish the kaleidoscopic generator used from other generators possessing different characteristics; of disassociating the mother sheet from the kaleidoscopic generator; of thereafter examining the markings made upon the mother sheet, to determine which kaleidoscopic generator should be used therewith; of selecting the proper kaleidoscopic generator and reassociating the mother sheet therewith by means of the markings made upon the mother sheet; of illuminating the mother sheet, and of conveying to the eye of the observer, either directly or indirectly, the image of the design thus regenerated.

12. The method of kaleidoscopically generating a stripe-like design which consists in arranging a plurality of reflectors in the form of a kaleidoscope unit of uniform cross section, the cross section constituting the form of an elongate rectangle, of placing a mother sheet bearing various characters adjacent to one end of the unit thus formed, of placing a screen adjacent to the other end of said unit, of illuminating said mother sheet to kaleidoscopically generate a design in the kaleidoscope unit, and of fixing the image of the design thus generated by said screen.

13. The method of kaleidoscopically generating a stripe-like design which consists in arranging a plurality of reflectors in the form of a kaleidoscope unit of uniform cross section, the cross section constituting the form of an elongate rectangle, of placing a mother sheet bearing various characters adjacent to one end of the unit thus formed, and of illuminating said mother sheet to kaleidoscopically generate a design in the kaleidoscopic unit.

14. In a kaleidoscope design generating apparatus, the combination with an individual-

ally portable kaleidoscope tube having a peripheral flange at its upper end, said flange defining a platform, and a mother sheet detachably secured to said platform transverse
5 the axis of the kaleidoscope tube; of a shelf whereon the tube is removably supported, said shelf having an aperture therethrough, and a light source positioned in spaced relation with respect to said shelf, for projecting
10 a light beam downwardly through the mother sheet, the kaleidoscope tube and the aperture in said shelf.

15. In a kaleidoscope design generating apparatus, the combination with an individu-

ally portable kaleidoscope tube having a 15 peripheral flange at its upper end, said flange defining a platform, and a mother sheet detachably secured to said platform across the end of said tube; of a shelf whereon the tube
20 is removably supported, said shelf having an aperture therethrough, a screen positioned in spaced relation with respect to said shelf, and a light source so positioned that its light beam
25 is projected through the mother sheet, the kaleidoscope tube, and the aperture in said shelf in succession, on to the screen.

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