United States Patent [19]

Furuoka et al.

[11] **3,900,956**

[45] **Aug. 26, 1975**

[54] **APPARATUS FOR DRAWING COMPOSITE PICTORIAL PATTERNS**

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[22] Filed: **Mar. 19, 1973**

[21] Appl. No.: **342,718**

[30] **Foreign Application Priority Data**

Apr. 15, 1972 Japan 47-44440
Apr. 15, 1972 Japan 47-44441

[52] **U.S. Cl.** ..... **33/174 B;** 74/21
[51] **Int. Cl.** **B44d 3/30**
[58] **Field of Search** ..... 33/174 B, 272; 74/21, 817, 74/818

[56] **References Cited**

UNITED STATES PATENTS

647,348	4/1900	Wiedner	74/21
1,211,793	1/1917	Horvath	33/174 B
3,568,327	3/1971	Furuoka	33/174 B
3,699,660	10/1972	Siegal	33/174 B

FOREIGN PATENTS OR APPLICATIONS

1,917,838	4/1969	Germany	33/174 B

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Assistant Examiner—Richard R. Stearns
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[57] **ABSTRACT**

A disc, perforated with one or more prototype apertures therethrough and having ratchet teeth on its periphery, is rotatably received in a circular opening of a substantially flat frame. A ratchet mechanism including a knob slidable along a graduated slot is provided on the frame for causing the disc to turn relative to the frame through a desired angle. The frame together with the disc is revolvable around a pin extending downwardly from its bottom to be pierced through a drawing surface, so that composite patterns can be delineated along a locus defined by combination of the rotation of the disc on its own axis and the revolution of the frame around the pin.

6 Claims, 7 Drawing Figures

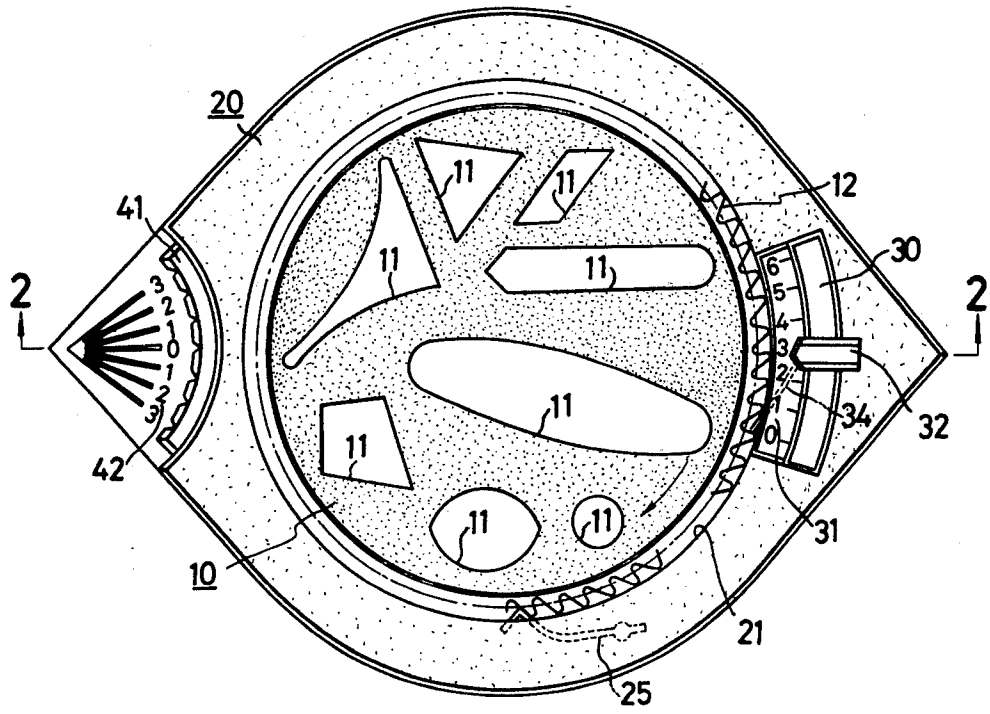


FIG.1

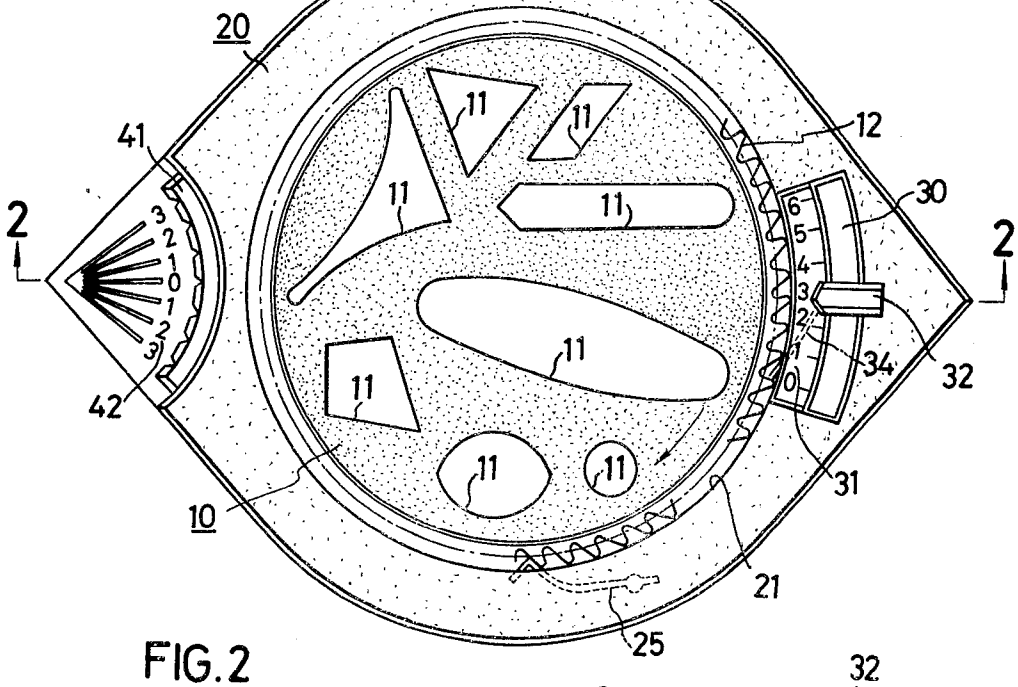


FIG.2

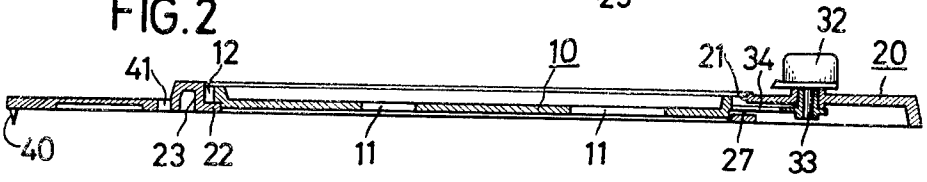


FIG.3

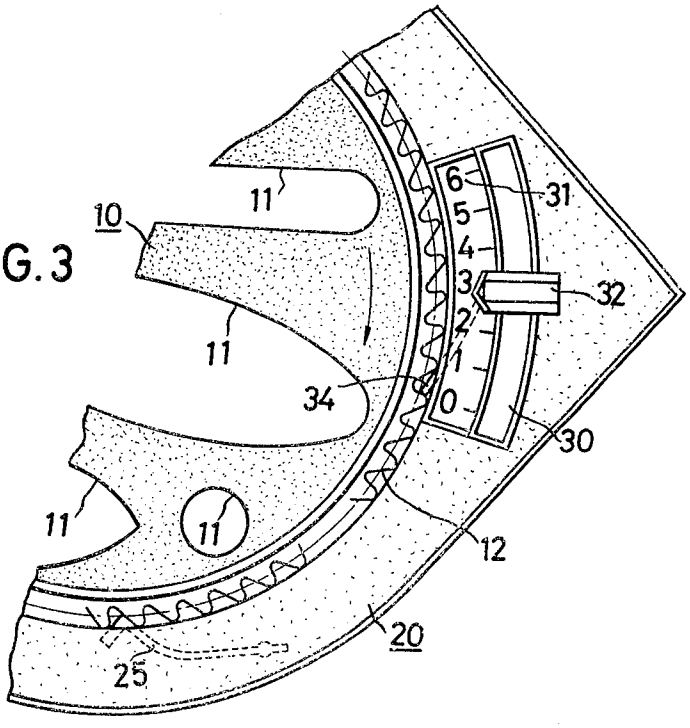


FIG.4

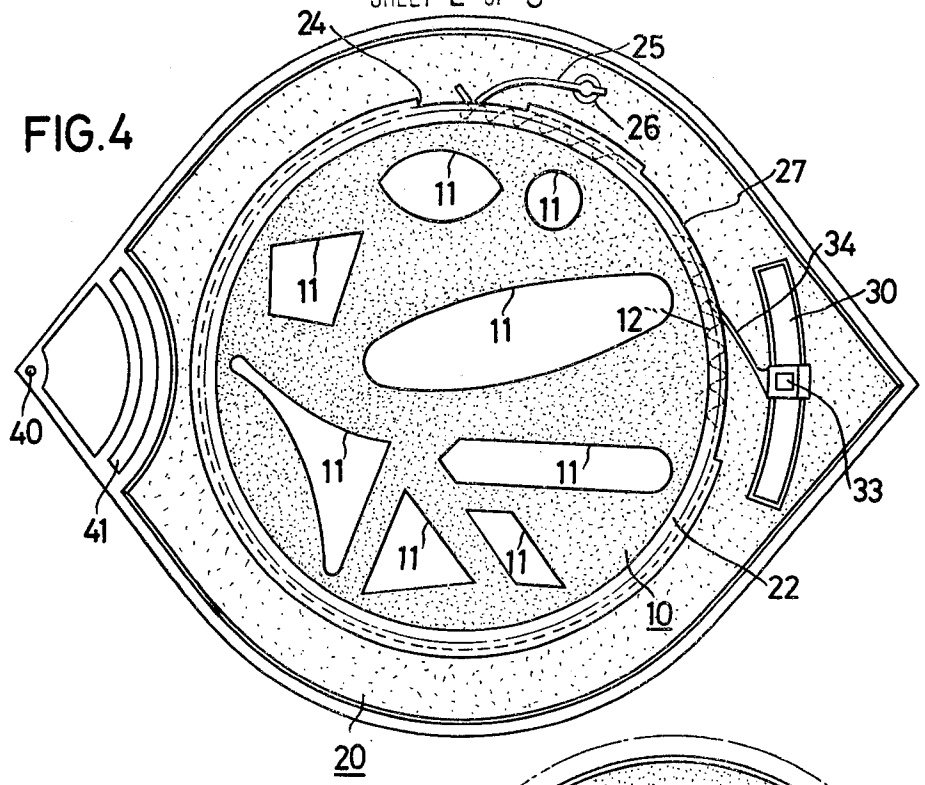


FIG.5

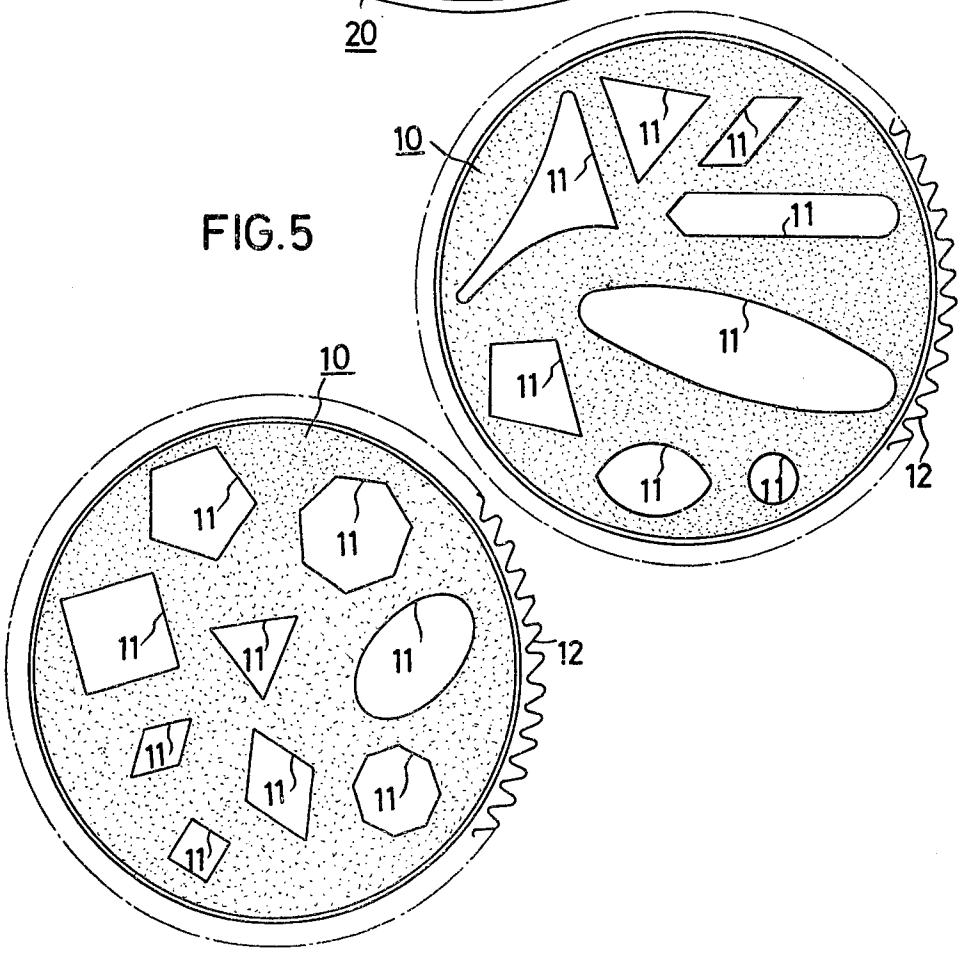
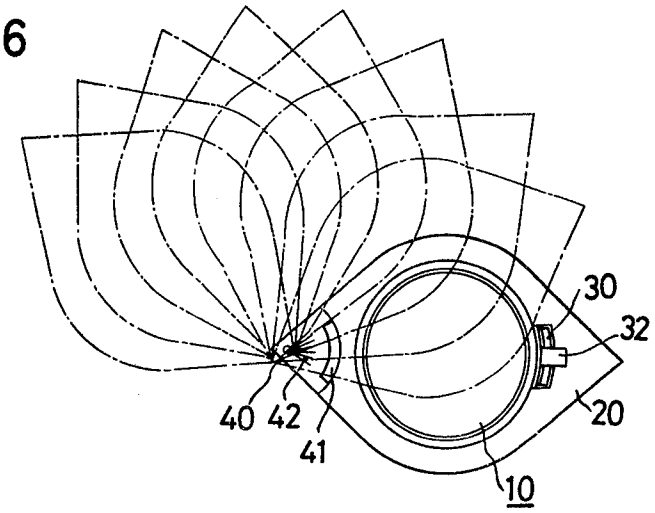


FIG.6



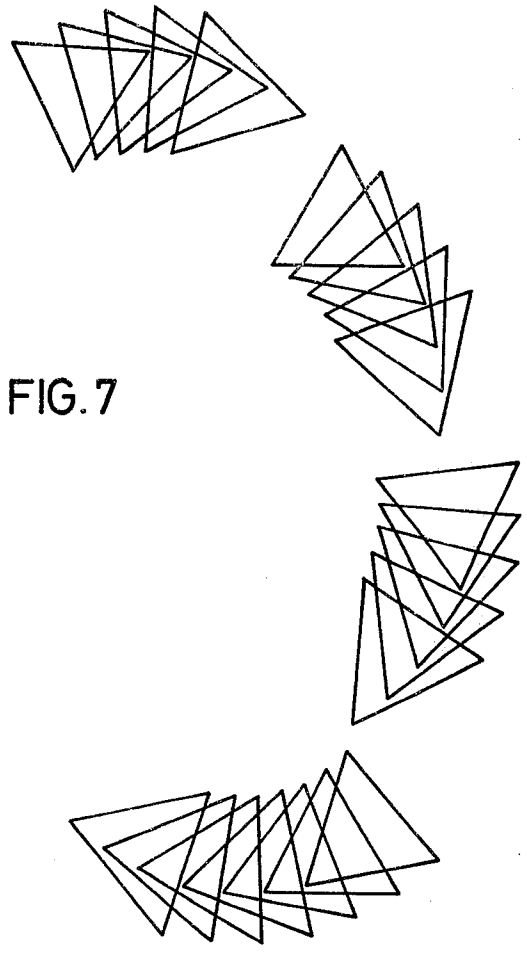


FIG.7

APPARATUS FOR DRAWING COMPOSITE PICTORIAL PATTERNS

The present invention relates to an apparatus for drawing composite pictorial or geometrical patterns with the aid of a writing implement, and in particular to improvements in the apparatus of the type disclosed in U.S. Pat. No. 3,568,327.

BACKGROUND OF THE INVENTION

The pictorial pattern drawing apparatus disclosed in the above referenced United States patent comprises an inner annular frame for holding a disc perforated with a prototype aperture or apertures, and an outer frame having a circular opening therethrough to rotatably receive the inner frame together with the disc held thereby. A plurality of equally spaced notches are formed on the periphery of the inner frame, and a locking member housed in the outer frame is urged by a helical compression spring to engage one of the notches on the inner frame. In use, a pattern is delineated on a desired drawing surface along the configuration of any desired prototype aperture by means of a suitable writing implement. The inner frame together with the disc is then manually turned relative to the outer frame by a desired number of the notches on the inner frame, the aforesaid locking member being caused forcibly to retract against the helical compression spring during transition from one to the next of the notches, and the same pattern is delineated again. By the repetition of this procedure, composite patterns are created on the drawing surface along a circular locus usually with equal angular spacings.

This prior art apparatus has proved to have a serious drawback in that the inner frame together with the perforated disc can be turned relative to the outer frame only with the exertion of great digital pressure. As a consequence, it has been very difficult to repeatedly turn the inner frame relative to the outer frame by the same number of notches. Moreover, because the inner frame and the perforated disc must be moved by direct touch of the fingertips, the prior art apparatus is easily displaced from its assigned position during a drawing operation.

It is a further disadvantage of this known apparatus that composite patterns can be drawn along a circular locus only. Although the aforementioned United States patent discloses additional embodiments in which a rack member is provided to cause the outer frame to revolve or travel linerarly thereon so that the patterns may be delineated along more complex loci, it has been found that this arrangement makes the overall apparatus unnecessarily expensive and inconvenient to use.

SUMMARY OF THE INVENTION

The present invention provides an apparatus for drawing composite pictorial patterns including a disc perforated with at least one prototype aperture along the configuration of which the composite pictorial patterns are to be delineated by means of a writing implement. The apparatus also includes a plurality of ratchet teeth formed on the periphery of the disc, and a substantially flat frame having a circular opening adapted to rotatably receive the disc. The apparatus also includes a ratchet mechanism supported by the frame for turning the disc relative to the frame by means of the ratchet teeth.

In view of the listed disadvantages of the prior art, it is an object of this invention to provide an improved pictorial pattern drawing apparatus wherein a disc having one or more prototype apertures therethrough and rotatably received in a holder or frame can be repeatedly turned through a desired angle relative to the frame with little exercise of manual effort, so that desired composite patterns can be delineated exactly along a circular or sectorial locus.

Another object of the invention is to provide a pictorial pattern drawing apparatus wherein an angle through which the disc is to be turned each time relative to the frame is selectable arbitrarily within a predetermined range, and is further visually confirmable by means of a set of graduations formed on the frame.

A further object of the invention is to provide a pictorial pattern drawing apparatus wherein the frame together with the disc rotatably supported thereby is revolvable around a pin extending downwardly from the bottm of the frame to be pierced through a drawing surface, so that desired composite patterns can be delineated along an epicycloidal or similar locus defined by combination of the rotation of the disc on its own axis and the revolution thereof around the pin.

A still further object of the invention is to provide a pictorial pattern drawing apparatus wherein an angle, through which the frame is to be turned each time around the pin, is determinable arbitrarily within a predetermined range and is further visually confirmable by means of another set of graduations formed on the frame.

With these objects in view and the other objects hereinafter made apparent, this invention provides an apparatus in which is provided a disc having at least one prototype aperture therethrough along the configuration of which composite pictorial patterns are to be delineated on a drawing surface by means of a writing implement. The disc is further provided with a plurality of equally spaced ratchet teeth on its periphery and is rotatably received in a circular opening of a substantially flat frame. A ratchet mechanism is provided on the frame for repeatedly turning the disc relative to the same through an angle selectable arbitrarily within a predetermined range.

The ratchet mechanism includes a knob coupled to a ratchet resiliently engaged with the teeth on the periphery of the disc. The knob is manually movable along a graduated slot for causing the disc to turn relative to the frame through an angle corresponding to one to several times the pitch of the ratchet teeth on the periphery of the disc. Thus, the composite patterns can be delineated along a circular locus either with equal or irregular angular spacings to give variety to the patterns created.

Further, according to the invention, the pictorial pattern drawing apparatus is provided with a pin extending downwardly from the bottom of the frame to be pierced through the drawing surface. The frame together with the disc rotatably supported thereby is thus rendered turnable around the pin, so that more intricate patterns can be delineated by appropriately selecting the angle through which the disc is turned each time relative to the frame, and the angle through which the frame is turned each time around the pin. It may be noted that as an additional advantage accruing from the provision of the pin, the frame is not to be inadver-

tently displaced from its assigned position on the drawing surface.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a preferred embodiment of a pictorial pattern drawing apparatus constructed in accordance with the present invention.

FIG. 2 is a vertical sectional view taken along the plane of line 2—2 in FIG. 1.

FIG. 3 is a fragmentary, enlarged top plan view showing in detail the means for turning a disc relative to a frame in the apparatus of FIG. 1.

FIG. 4 is a bottom plan view of the apparatus of FIG. 1.

FIG. 5 is a plan view showing two interchangeable discs for use in the apparatus of FIG. 1.

FIG. 6 is a schematic top plan view explanatory of the revolution of the frame around a pin extending downwardly from its bottom in the apparatus of FIG. 1.

FIG. 7 shows an example of composite pictorial patterns delineated by combination of the rotation of the disc relative to the frame, and the revolution of the frame around the pin.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A pictorial pattern drawing apparatus illustrated in FIGS. 1 to 5 by way of a preferred embodiment of this invention includes a disc **10**, usually made of plastics or the like shown specifically in FIG. 5. The illustrated disc **10** has one or more prototype apertures **11** therethrough which may be any desired shape, such as circular, triangular, elliptical, rhomboidal, trapeziform, and so forth. A plurality of such discs, each having a different set of prototype apertures therethrough, may be provided interchangeably for the pictorial pattern drawing apparatus according to the invention. FIG. 5 shows, purely by way of example, two such interchangeable discs having prototype apertures of different shapes and sizes. The disc **10** may have equally spaced ratchet teeth **12** on its periphery. However, if desired, the teeth **12** may be spaced at varying intervals.

As best illustrated in FIGS. 1 and 2, the disc **10** is rotatably received in a circular opening **21** of a substantially flat holder or frame **20** which also may be formed of plastics or the like. The frame **20** is integrally provided with a step or stage **22** (FIG. 2) to slidably support the peripheral portion of the disc **10**.

As may be clear from the bottom view of the apparatus shown in FIG. 4, the inside edge **23** of the frame **20** delimiting the circular opening **21** is recessed at **24** to permit a pawl **25** to extend therethrough to resiliently engage the ratchet teeth **12** on the periphery of the disc **10**, the pawl **25** being affixed at **26** to the back face of the frame **20**. In this manner the disc **10** is prevented from free rotation relative to the frame **20**.

Referring again to FIGS. 1 to 3 in particular, an arcuate guide slot **30** is formed in the frame **20** concentric with the circular opening **21**. The guide slot **30** must be of such length as to span a plurality of, seven in this particular embodiment, ratchet teeth on the periphery of the disc **10**. Along the guide slot **30** there is formed a set of graduations **31** which may be numbered consecutively from **0** to **6** as shown in FIGS. 1 and 3. The spacing from one to the next of the graduations **31** corresponds to the pitch of the ratchet teeth **12**. A lever or rod **33** received in the guide slot **30** is coupled to a ratchet **34** which extends through a recess **27** formed in the inside edge **23** of the frame **20** to resiliently engage the ratchet teeth **12** on the periphery of the disc **10**. A knob **32** provided on the rod **33** is slidable along the guide slot **30** to cause the disc **10** to turn relative to the frame **20** by the action of the ratchet **34**.

The preferred embodiment of the invention being constructed substantially as hereinbefore described, the user may fixedly hold the frame **20** on a sheet of drawing paper with one of his hands and delineate a pattern along the configuration of the selected one of the prototype apertures **11** by a suitable writing impelement held in the other hand. The disc **10** is then caused to rotate relative to the frame **20** by means of the knob **32** through a desired fraction of the angle corresponding to six times the pitch of the ratchet teeth **12** in this embodiment of the invention. Thereafter the same pattern is delineated again on the drawing sheet. By the repetition of this procedure, composite patterns can be created on the drawing sheet along a circular or sectorial locus.

For thus causing the disc **10** to rotate relative to the frame **20** through a desired angle, the knob **32** is manually moved from the graduation number **0** to any of the other graduations corresponding to the angle through which the disc **10** is to be rotated, and is returned again to **0**. For example, if the knob **32** shown on the graduation numbered **3** in FIGS. 1 and 3 is thence returned to **0**, the disc **10** will be caused by the ratchet **34** to turn clockwise, as seen in the same drawings, relative to the frame **20** through an angle corresponding to three times the pitch of the ratchet teeth **12**. Because it is assumed that the ratchet **34** is made of suitably resilient material, it will slide over the inclined side of each ratchet tooth **12** when the knob **32** is moved upwardly (as viewed in FIGS. 1 and 3) of the guide slot **30**, but will be held arrested by the radial side of any ratchet tooth when the knob is moved downwardly. In this manner the disc **10** can be turned each time through any desired angle up to the limit corresponding to six times the pitch of the ratchet teeth **12** in this embodiment of the invention.

Further, according to this invention, a pin **40** extends downwardly from the frame **20**, the pin having a pointed end to be pierced through a drawing surface as best shown in FIG. 2, so that the frame **20** together with the disc **10** can be turned around the pin. An arcuate slot **41** is formed through the frame **20** adjacent to the pin **40**. It will be noted from FIG. 1 that the slot **41** is arched around an axis located at the position of the pin **40**. A set of angularly spaced graduations **42** is formed along the arcuate slot **41** to indicated angles through which the frame **20** together with the disc **10** is to be turned around the pin **40**.

The pictorial pattern drawing apparatus thus constructed is placed as aforesaid on a sheet of drawing paper. Since now the pin **40** is pierced through the drawing sheet, the frame **20** will not be easily displaced from its assigned position even though the disc **10** may be turned repeatedly by the knob **32**. In order to delineate composite patterns by any of the prototype apertures **11**, not only the disc **10** may be rotated relative to the frame **20** as above explained, but also the frame **20** as well as the disc **10** may be turned around the pin **40** as illustrated in FIG. 6. The frame **20** can be repeatedly turned through a desired angle around the pin **40** with

the aid of the angularly spaced graduations **42** and the arcuate slot **41**, as by leaving a small reference mark on the drawing sheet through the slot **41** at the graduation numbered zero and then by turning the frame **20** in either direction until the reference mark meets the desired one of the rest of the graduations.

In this manner, the disc **10** can be caused both to rotate on its own axis and to revolve around the pin **40**. FIG. **7** illustrates an example of composite patterns delineated by combination of the rotation of the disc **10** relative to the frame **20** and of the revolution of the frame around the pin **40**. It is to be noted, however, that composite patterns can be created either by the rotation of the disc of its own axis, or by its revolution around the pin **40**, or by combination of both.

Although the pictorial pattern drawing apparatus according to the invention has been shown and described hereinbefore in terms of a preferred embodiment thereof, it is to be understood that the invention itself is not to be restricted by the exact showing of the drawings and the description thereof. A latitude of modification, substitution and change is intended in the foregoing disclosure and in some instances some features, while still remaining within the spirit and scope of the invention as defined by the appended claims.

We claim:

1. An apparatus for drawing composite pictorial patterns comprising, in combination:

a disc perforated with at least one prototype aperture the periphery of which defines a particular configuration and is used as a guide for a writing implement to form an individual pattern;

a plurality of ratchet teeth formed on the periphery of said disc;

a substantially flat frame having a circular opening adapted to rotatably receive said disc;

a ratchet mechanism supported by said frame for turning said disc relative to said frame by means of said ratchet teeth;

said ratchet mechanism comprises

a ratchet resiliently engaged with said ratchet teeth at one end thereof and connected to a knob at the other end thereof,

said knob being slidably mounted on said frame for causing said ratchet to turn said disc relative to said frame in a predetermined direction, and

a pawl affixed to said frame at one end thereof and resiliently engaged with said ratchet teeth at the other end thereof for preventing any undesired rotation of said disc relative to said frame; and

wherein said knob is connected to said ratchet through a slot formed in said frame so as to be slidable along said slot, said slot comprising an arcuate opening whose center of curvature is the axis of said disc.

2. The apparatus according to claim **1**, wherein said slot is concentric with said circular opening, and said teeth are spaced equally apart from each other.

3. An apparatus for drawing composite pictorial patterns comprising in combination:

a disc perforated with at least one prototype aperture the periphery of which defines a particular configuration and is used as a guide for a writing implement to form an individual pattern;

a plurality of ratchet teeth formed on the periphery of said disc;

a substantially flat frame having a circular opening adapted to rotatably receive said disc;

a ratchet resiliently engaged with said ratchet teeth at one end thereof; and connected to a knob at the other end thereof

said knob being slidably mounted on said frame through a slot, for causing said ratchet to turn said disc relative to said frame in a predetermined direction;

said slot being concentric with said disc and including a set of graduations formed along said slot to be referenced in causing said disc to turn through a desired angle relative to said frame by means of said knob; and

a pawl affixed to said frame at one end thereof and resiliently engaged with said ratchet teeth at the other end thereof for preventing any undesired rotation of said disc relative to said frame.

4. The apparatus according to claim **3** wherein said plurality of ratchet teeth are spaced equally apart from each other.

5. The apparatus as defined in claim **4**, wherein the spacing from one to the next of said graduations corresponds to the pitch of said ratchet teeth.

6. An apparatus for drawing composite pictorial patterns comprising in combination:

a disc perforated with at least one prototype aperture the periphery of which defines a particular configuration and is used as a guide for a writing implement to form an individual pattern;

a plurality of ratchet teeth formed on the periphery of said disc;

a substantially flat frame having a circular opening adapted to rotatably receive said disc;

a ratchet mechanism supported by said frame for turning said disc relative to said frame by means of said ratchet teeth;

a pin extending downwardly from the bottom of said frame and having a pointed end to be pierced through a drawing surface, whereby said frame is rendered turnable around said pin together with said disc rotatably received in said circular opening thereof;

a slot formed in said frame adjacent to said pin, said slot comprising an arcuate opening whose center of curvature is an axis located at the position of said pin, and a set of angularly spaced graduations formed along said slot, said slot and angularly spaced graduations being utilizable in repeatedly turning said frame around said pin through a desired angle.

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