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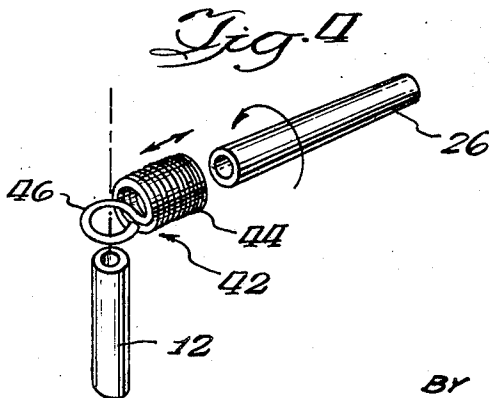
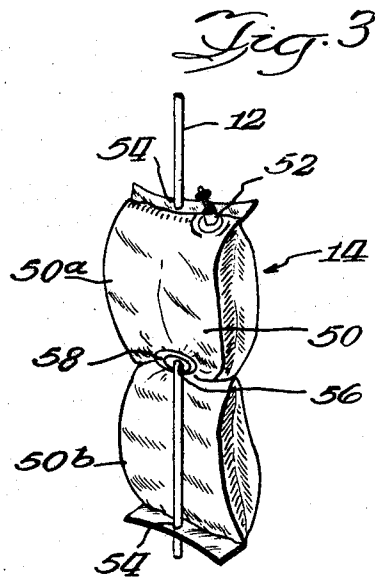
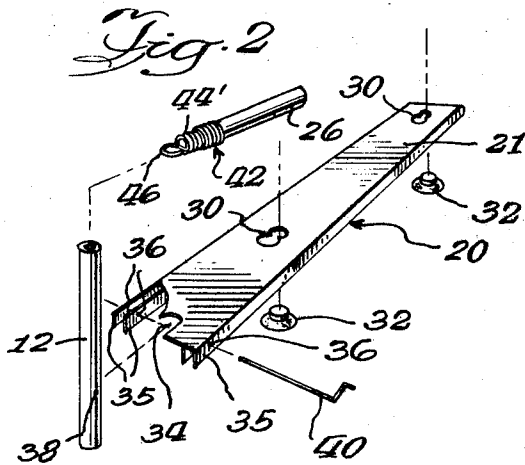
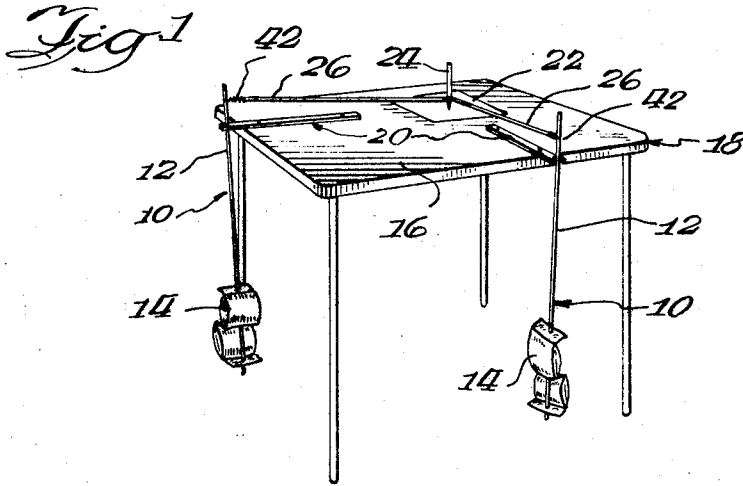
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3,494,037

PENDULUM ACTUATED DRAWING INSTRUMENT

Filed March 6, 1968

2 Sheets-Sheet 1



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PENDULUM ACTUATED DRAWING INSTRUMENT

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2 Sheets-Sheet 2

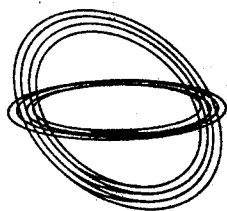
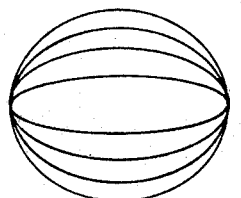
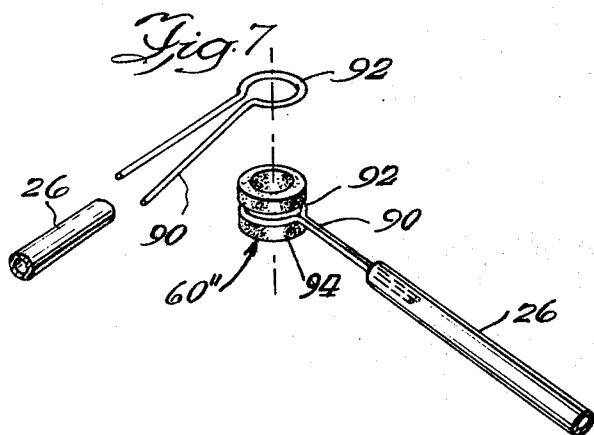
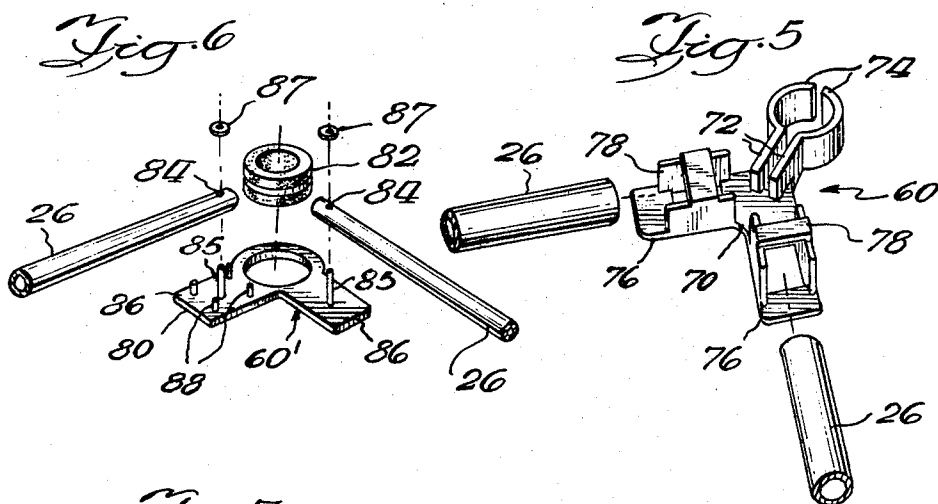


Fig. 9

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PENDULUM ACTUATED DRAWING INSTRUMENT

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8 Claims

ABSTRACT OF THE DISCLOSURE

A pendulum-actuated drawing instrument having at least two adjustable pendulums mechanically coupled with an inscribing instrument such that upon actuation of the pendulums, the resulting movement of said instrument traces a repetitive pattern of decreasing magnitude which can be varied by adjustments to said pendulums. This instrument employs a pendulum wherein an axially adjustable pendulum weight is provided by a flexible container adapted to be inflated with water or other liquid, a novel universal movement connection for the pendulum rod and the arm linking same to the inscribing instrument, a support which facilitates assembly and provides still another means for varying the pattern produced, all of the above being of easily assembled and knock-down construction for convenient and economical packaging.

BACKGROUND OF THE INVENTION

The invention relates to improvements in a pendulum-actuated drawing instrument of the type disclosed in U.S. Patents Nos. 1,869,951 and 3,324,556, issued to G. E. Worthington and George Everett, respectively, which enable significant and material benefits and economies in manufacture and use to be realized.

The basic principle of operation of the drawing instrument embodying the invention is known. Briefly, this instrument produces intricate and fanciful line configurations and designs by employing two pendulums coupled with an inscribing or drawing tool. The motion of each pendulum is superimposed in consort upon said tool so that the ultimate or final movement of the tool is the resultant of the individual pendulum movements. The various structural parts or elements of the instrument are so oriented that the inscribing tool can be caused to trace the design or configuration on a sheet of paper or plastic corresponding to its path of movement. However, due to the periodic but decreasing movement of the pendulums, the basic pattern traced will remain the same but will decrease in magnitude, providing a symmetrical and attractive design. Thus, since the resultant movement of the inscribing instrument is a function of the period or timing of the pendulum swing, an infinite number of patterns may be achieved by adjusting the relative position of the respective pendulum weights, which in turn changes the pendulum period.

The drawing instruments illustrated in the above noted patents, like that of the present invention are capable of producing a wide assortment of interesting and attractive patterns. However, unlike the present invention, these prior art devices are subject to numerous disadvantages with regard to set-up convenience and operation, and also from the standpoint of manufacturing, packaging and marketing the instrument.

The prior art devices are cumbersome by comparison and utilize rather inconvenient and impractical mounting and supporting arrangements. For example, the Worthington device must be attached or positioned at the corner of table, otherwise the pendulum will not be able to swing freely. While the aforementioned disadvantage of the Worthington device is avoided by that of Everett,

Everett's structure utilizes a separate drawing platform positioned above a weighted unitary base, which is necessary to counter or balance the moment created by the pendulum weights. With this construction the pivot points for the pendulum rods must be above the level of the supporting table, and thus, the arc through which the pendulum may swing without striking the table is limited severely.

In addition, the prior art devices are expensive to manufacture, package and market, so as to hinder and dissuade wide public acceptance. One factor that has contributed to this is that said devices all employ pendulum arrangements having relatively massive and hard cylindrical coaxial pendulum weights. Not only does the excessive mass of these pendulum weights add to the overall manufacturing cost, but the primary disadvantage lies in the fact that this arrangement results in a final product of substantial weight and volume which is costly to package and ship. Thus, when these factors are taken into account, improvements which can materially reduce the overall cost of the instrument is of significant import in regard to the provision of a marketable item. Also, such swinging, fast-moving, massive and hard pendulum-weights are dangerous to toddlers and crawling children in a home where the instrument may be used.

Also, an analysis of the operation of a pendulum device of the instant type reveals that it is necessary to employ some form of universal connection between the pendulum rods and the arms or links which operatively connect same to the inscribing tool. This fact can be appreciated by viewing the device in operation or the resulting designs, since it is clear that the arms must pivot with respect to the upper end portions of the pendulum rods while remaining connected thereto for joint movement. The prior art constructions necessitated the use of rather costly universal type couplings to obtain this freedom of movement. Thus, another area wherein costs can be reduced without sacrificing performance is in the provision of an inexpensive coupling arrangement which provides the requisite universal movement.

Because of the relative heavy mass of the pendulum rods and the rods connected with the drawing tool in the prior art devices, there resulted a substantial pressure on the marking point of the drawing tool and increased friction between that marking point and the surface of the sheet material. The herein invention employs hollow, flexible tubing to eliminate this undesirable mass and friction by realizing greater flexibility to facilitate the universal movement desired at the coupling points of the inventive instrument. The drag on drawing tool is reduced to give rise to finer line production and longer run of the lines drawn.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the drawing instrument of the present invention assembled on a table.

FIG. 2 is a fragmentary exploded perspective view illustrating a preferred form of the pendulum support means, the pivotal connection between said means and the pendulum rod, and means for providing the universal connection between the pendulum rod and the arm connecting said rod to the inscribing tool.

FIG. 3 is a perspective view of the pendulum weight construction of the present invention.

FIG. 4 is an enlarged exploded perspective view of the universal type connection between the pendulum rod and the arm, previously illustrated in FIG. 2.

FIGS. 5, 6 and 7 are exploded perspective views illustrating three modifications of holder arrangements for the inscribing tool, each of which arrangements is provided with means for coupling the linking arms thereto.

FIGS. 8 and 9 are representative patterns or designs achieved with the drawing instrument of the invention.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

The pendulum-actuated drawing instrument embodying the invention is illustrated in FIG. 1, operatively positioned relative to a table. The instrument employs a pair of pendulum arrangements, designated generally 10, each of which includes a pendulum rod 12 of hollow tubing, preferably, and a weight 14. Each pendulum arrangement 10 is vertically disposed relative to the horizontal surface 16 of a table 18, or the like horizontal support surface by the pendulum supporting structures designated generally 20. Supporting structures 20 are secured to table 18 in any desired manner, a preferred form of which is illustrated in and will be discussed in regard to FIG. 2. The pendulum rods 12 are connected to the respective supporting structures 20 at points intermediate their ends, such that they are free to pivot with an upper portion of each rod 12 extending above the level of surface 16. Positioned on surface 16 is a sheet of drawing paper 22 located to be engaged by the inscribing tool 24. Operatively connecting the inscribing tool 24 to the respective upper portions of pendulum rods 12 are the elastic arm or linking members 26 preferably made of high impact, styrene tubing of light weight and good strength. Accordingly, during oscillation of the pendulums 10, movement will be transmitted to the inscribing tool 24 by arms 26 causing the inscribing tool 24 to trace a design corresponding to its path of movement, which as discussed above, is the resultant of superimposed individual pendulum movements.

To achieve a uniform repetitive design or pattern, it is desirable that the movement of a pendulum 10 be confined as much as possible to oscillation in a single vertical plane, and further, that the engagement or coupling between arm 26 and the upper end portion of the rod 12 be maintained at all times. However, regarding this latter point, it must be understood that in operation the movement of each arm 26 will not be of a simple linear nature, but rather will be a combination of both linear and pivotal movement, viz, the arm 26 must pivot about its point of connection with rod 12 as well as oscillate therewith. Thus, uniform patterns can be achieved only by providing a universal type connection for coupling the respective elements 12 and 26 together.

A preferred form of the supporting structure 20 for pivotally mounting a pendulum 10 to the table 18 to attain the uniform uniplanar movement heretofore discussed is illustrated in FIG. 2. Supporting structure 20 is comprised of a pendulum support base 21 provided with a plurality of key-hole apertures 30 in which are disposed suction cups 32. Accordingly, once the desired position for the supporting arrangement is ascertained, suction cups 32 are engaged with the upper surface of the table 18 to fix the position of the supporting structure 20 thereon. To provide for the pivotal mounting of a pendulum rod 12, one end of the base 21 is notched at 34 to receive the pendulum rod 12 therethrough. Further, there are provided longitudinal end flanges 35 on opposite sides of the notches 34, said flanges 35 having aligned apertures 36, the axis of which passes beneath notch 34. Accordingly, the pendulum rod 12 is provided with a corresponding aperture 38 such that said rod may be disposed in notch 34 with the apertures 36 and 38 in alignment and pin 40 passed therethrough, thereby pivotally mounting the pendulum rod 12 relative to the support base 21.

FIG. 4 illustrates the spring coupling means of the present invention which provides the necessary universal connection between the arm 26 and the respective pendulum rod 12. The spring coupling means is designated generally 42, and is comprised essentially of two portions or segments; the elongated sleeve-like coiled portion 44 and the loop portion 46, which are orthogonally related,

viz, portion 46 lies in a plane substantially perpendicular to that of a section taken through portion 44 and perpendicular to the axis thereof. This means is also referred to herein as a spring coupler.

Upon assembly of the respective elements illustrated in FIG. 4, arm 26 is disposed within the sleeve-like portion 44 while the loop portion 46 is slidably engaged over the pendulum rod 12. Since the individual coils of section 44 are designed to have purchase with the outer periphery of arm 26, they will in effect function as a screw thread thereby facilitating engagement which may be achieved by merely rotating arm 26 relative to the coiled portion 44. With regard to the assembled arrangement of FIG. 4, arm 26 should be engaged only halfway within the sleeve-like coiled portion 44 as illustrated in FIG. 2, thus providing an intermediate section 44' between the end of arm 26 and portion 46. It should be noted that total disposition of arm 26 in portion 44 will substantially hinder the desired articulated movement and tend to dampen prematurely the motion of pendulums 10. Accordingly, when the respective elements 12 and 26 are joined as described above, the oscillatory movement of the upper portion of pendulum rod 12 will be directly transmitted to arm 26, while due to the flexible nature of the intermediate section of the coiled portion 44, the arm 26 is free to pivot or yaw and pitch relative to rod 12 under the influence of the corresponding arm member.

As will be recalled from the preceding discussion, the form of overall configuration of the design traced is dependent upon the characteristics of the respective pendulum arrangements 10. More specifically, adjustment of the position of the weights 14 along the length of the rods 12 varies the period or timing of the individual pendulum swings, and correspondingly changes the resultant movement of the inscribing tool 22. While this is the primary manner of effecting variance in the pattern traced, by adjusting the position of the spring coupler 42 with respect to the upper portion of pendulum rod 12, the length-to-width ratio of pattern also may be varied. Still another factor which influences the overall configuration of the pattern traced is the relative angular displacement of the arms 26. In this regard, it should be noted that the smaller the angle of displacement the larger the overall pattern traced; and conversely, the larger the angle of displacement, the smaller the overall pattern traced. In contradistinction, the universal type coupling arrangements and the pendulum supporting structures disclosed in the above discussed prior art do not provide for the aforementioned modes of adjustment. In addition, the adjustable mounting afforded by the present invention adapts the device for either an "across-the-corner" setup, as illustrated in FIG. 1, or an "along-the-edge" arrangement, not shown.

In FIG. 3 there is illustrated in detail, the novel pendulum weight 14 of the present invention. Pendulum weight 14 is comprised of a flexible soft and smooth plastic bag member or container 50 which is closed at its opposite ends and provided with a re-sealable filling spout 52. When it is desired to set up the device of the present invention, one need only fill the respective bag member 50 with water, or the like, through spout 52 to provide the necessary weight or mass for the pendulum arrangement.

To accommodate the adjustment of weight 14 along the length of rod 12, bag 50 is provided with apertures 54 in the closed end portions, and an aperture 56 substantially in the middle of said bag, said apertures slidably receiving rod 12 therein and causing locking of the bag thereon. The latter aperture 56 is necessitated to evenly distribute the pendulum weight with respect to rod 12. Aperture 56 may be provided in a variety of manner, but since it best be in the center of the bag 50, it is preferential to employ an apertured plastic fitting 58 which assures the water-tight nature of the construction,

The double aperture provision in the bag enables the bag to be shifted axially along the rod and locked in the desired position therefor by reason of the weight of the water on opposite sides of the rod. Note that there are upper and lower bag portions 50a and 50b, respectively, on opposite sides of rod 12.

Regarding the prior art, and upon viewing the pendulum weight construction 14 of FIG. 3 and the universal type connection of FIG. 4 afforded by spring coupler 42, it can be seen that all the necessary structural elements of a pendulum operated drawing device are provided. However, the manufacturing procedure has been simplified, the shipping package weight and volume held to a minimum, and correspondingly the overall cost of the device reduced.

Turning now to FIGS. 5, 6 and 7, various embodiments of inscribing tool holders are illustrated. Basically, the holders of the said figures, which will be designated generally 60, 60' and 60'', respectively, are comprised of means operatively receiving the inscribing tool 24, and connection structure for attaching the ends of arms 26 thereto. Each holder is specifically designed to fast receive, hold and release a ball-point pen and such a pen of possibly different cross-section configuration and size and shape. A very light-weight tool can be used, such as a refill for a ball-point pen.

As to FIG. 5, the holder 60 is an integral plastic member 70 provided with a pair of resilient spring-like fingers 72 having arcuate ends which cooperate to define a split sleeve 74. Thus, upon assembly, the inscribing tool 24 is merely inserted in sleeve 74 which will expand and, due to its resiliency, hold instrument 24 in place. To provide for the connection of the arm 26 thereto, member 70 has a pair of integral extensions 76 having sleeve formations 78, each of which matingly receive one of the ends of arms 26.

In FIG. 6, holder 60' is comprised of an apertured member 80, having a grommet 82 positioned in said aperture. The grommet 82 is constructed of an expandable elastomeric material and fast receives, properly positions, and easily releases the inscribing instrument 24. Like holder 60 of FIG. 5, the holder of FIG. 6 employs a pair of integral extensions 86, and has means thereon for connection with the ends of arms 26. With this embodiment, the ends of arms 26 are apertured at 84 and each extension provided with a corresponding post 85 insertable in said aperture, the respective elements are maintained in engagement by keeper washers 87 which are disposed over posts 85 after assembly.

It must be noted that the connecting means of FIG. 6 permits pivotal movement between both of arms 26 and holder 60'. While this is often desirable with regard to one of said arms, it is necessary to maintain an unarticulated connection between holder 60' and the other of said arms 26. Accordingly, one of the extensions 86 is provided with a plurality of protuberances 88 which engage on the opposite sides of the respective arm member to prevent movement relative to the holder 60'.

Holder 60'', as illustrated in FIG. 7, is comprised of a pair of bifurcated or reverse-bent wire elements 90, the closed end of each defining an arcuate portion 92, the bifurcated ends diverging slightly in the unassembled state. The instant embodiment employs an elastomeric holding grommet 94 similar to that of FIG. 6, said arcuate end portions 92 being engaged over the grommet 94 to maintain the holder in assembly. In this embodiment hollow or tubular arms 26 are employed, whereby assembly to holder 60'' is effected by inserting the bifurcated diverging ends of elements 90 in the ends of said arms 26, as illustrated in the right-hand portion of FIG. 7.

It can be appreciated that provision of a holder which can accommodate a ball-point pen provides for more accurate and determinable patterns since the point does not wear, as would be the case with a pencil or crayon or the like.

The patterns or designs of FIGS. 8 and 9 are illustrative of but two of the infinite number of designs that can be obtained with a device of this type. Obviously, the designs can be superimposed, one upon the other, and different colored inscribing instruments used to enhance the overall aesthetic effect.

Although the device of the present invention can be regarded also as a toy, it is believed apparent that it may be useful in many other areas, for example, in the fields of mental therapy and physical health for use by shut-ins and as an educational device. Accordingly, it is believed that the advantages and benefits derived from the invention will be apparent from the foregoing detailed description of the illustrated embodiments. It is further contemplated that various changes, modifications and substitutions may be made without departing from the spirit and scope of the invention, as defined by the appended claims.

What is desired to be secured by Letters Patent of the United States is:

1. A pendulum-actuated drawing instrument for inscribing a variety of patterns on a sheet of paper, plastic or like writing material, said instrument including means for positioning an inscribing tool in engagement with said sheet, at least two pendulums each having an elongate rod and a weight capable of being adjustably positioned along the length of said rod, a support for mounting said pendulums in swingable relation relative to a horizontal planar surface with the upper end portions of each elongated rod extending above said surface, at least two flexible arm members, each adapted to be connected operably at one end thereof to respective pendulum rods so as to extend transversely thereof, the other ends of said arm members adapted to be associated with each other and with said means for positioning an inscribing tool whereby upon assembly of said device with respect to said planar surface, said arms will extend longitudinally thereof so that movement of said pendulums will be transmitted to said inscribing tool positioning means by said flexible arm members, wherein the improvement includes a pendulum weight comprised of a soft, flat container adapted to be inflated with water or the like and having means associated therewith for adjustably mounting said container on the pendulum rod, said means for adjustably mounting the container comprising a plurality of apertures in said container which slidably receive the pendulum rod, said apertures so positioned as to distribute the mass of the inflated container substantially equally on opposite sides of said rod.

2. A pendulum-actuated drawing instrument for inscribing a variety of patterns on a sheet of paper, plastic or like writing material, said instrument including means for positioning an inscribing tool in engagement with said sheet, at least two pendulums each having an elongate rod and a weight capable of being adjustably positioned along the length of said rod, a support for mounting said pendulums in swingable relation relative to a horizontal planar surface with the upper end portions of each elongated rod extending above said surface, at least two flexible arm members, each adapted to be connected operably at one end thereof to respective pendulum rods so as to extend transversely thereof, the other ends of said arm members adapted to be associated with each other and with said means for positioning an inscribing tool whereby upon assembly of said device with respect to said planar surface, said arms will extend longitudinally thereof so that movement of said pendulums will be transmitted to said inscribing tool positioning means by said flexible arm members, wherein the improvement includes a pendulum weight comprised of a soft, flat container adapted to be inflated with water or the like and having means associated therewith for adjustably mounting said container on the pendulum rod, said means for positioning the inscribing tool including a holder, said holder including a

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resilient expandable member for frictionally receiving said tool, and means for attaching said arms thereto.

3. An instrument as defined in claim 2 wherein said holder is a unitary plastic member having a split sleeve which defines said resilient expandable portion for operatively receiving the drawing tool.

4. An instrument as defined in claim 3 wherein said means for attaching the arm member to said holder comprises a pair of extensions on said unitary member, each extension defining a sleeve for receiving therein the end portion of a respective arm member.

5. An instrument as defined in claim 2 wherein said resilient expandable member is an elastomeric grommet.

6. An instrument as defined in claim 5 wherein said means for attaching the arm members to the holder comprises a pair of bifurcated wire elements, each having an arcuate section engaged about said grommet, the bifurcated portions of said elements diverging and adapted to be received in the end portion of a hollow arm member.

7. A pendulum-actuated drawing instrument for inscribing a variety of patterns on a sheet of paper, plastic or like writing material, said instrument including means for positioning an inscribing tool in engagement with said sheet, at least two pendulums each having an elongate rod and a weight capable of being adjustably positioned along the length of said rod, a support for mounting said pendulums in swingable relation relative to a horizontal planar surface with the upper end portions of each elongated rod extending above said surface, at least two flexible arm members, each adapted to be connected opera-

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bly at one end thereof to respective pendulum rods so as to extend transversely thereof, the other ends of said arm members adapted to be associated with each other and with said means for positioning an inscribing tool whereby upon assembly of said device with respect to said planar surface, said arms will extend longitudinally thereof said that movement of said pendulums will be transmitted to said inscribing tool positioning means by said flexible arm members, the improvement comprising spring coupler means for connecting said arm members to the upper portion of the elongated pendulum rods to provide for universal movement therebetween, each of said spring couplers including a first sleeve-like coiled portion adapted matingly to engage the end of said arm and a second arcuate portion for slidably receiving the upper end portion of the elongated pendulum rod, such that the points of connection along said elongated rods are adjustable to vary the size of the pattern to be inscribed.

8. An instrument as described in claim 7 in which said arm members and pendulum rods comprise plastic, hollow tubular members of light-weight character.

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