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SILK SCREEN STENCIL AND HOLDER

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FIG. 1.

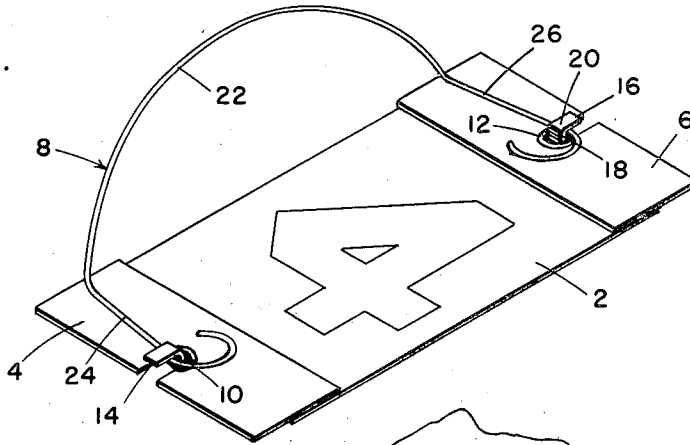


FIG. 2.

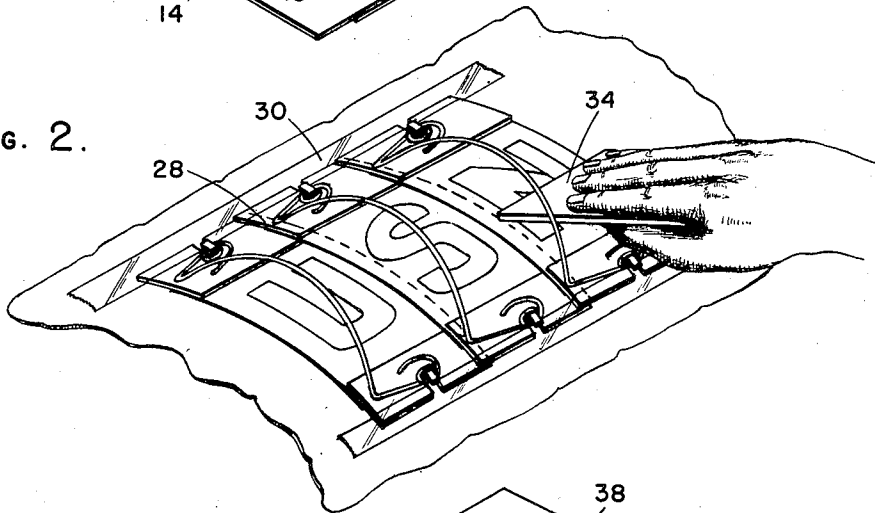
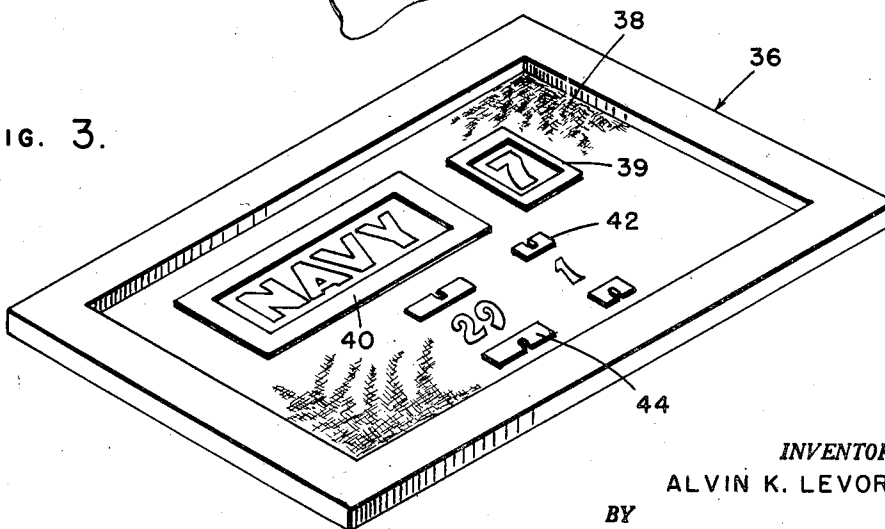


FIG. 3.



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SILK SCREEN STENCIL AND HOLDER

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2 Claims. (Cl. 101—127.1)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon on or therefor.

This invention relates to silk screen process printing apparatus and methods of manufacturing and using the same.

According to the usual prior art, the silk screen process for printing is restricted to the use of relatively large silk screen frames over which the silk can be readily stretched taut and tacked in place and which can be used under such circumstances as to maintain the silk more or less in a plane. According to the present invention, relatively small silk screen apparatus can easily be made and can be used in situations where it is desirable or necessary to print on a curved surface. Thus the apparatus of the present invention can be used to substitute for stencils, taking advantage of all the known superiorities of silk screening over stenciling.

A principal object of this invention is to provide silk screen apparatus which is pliable, for use on and application to curved surfaces as well as to plane surfaces.

Another object of this invention is to provide a method of making relatively small silk screen devices, including both rigid-frame types and other types, which are more or less pliable and thus adaptable for both flat and curved surfaces, and of making the same in a simple and economical manner.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is an isometric view of one preferred embodiment of an apparatus made according to the present invention;

Fig. 2 is an isometric view showing the use of several examples of the apparatus of Fig. 1 applied to print on a curved surface; and

Fig. 3 is an isometric view of a portion of a standard large size silk screen frame showing, in the process of manufacture therefrom, several examples of preferred embodiments of the present invention.

Ordinary methods of lettering or otherwise marking various surfaces with semi-mechanical formation of indicia as distinguished from freehand application, usually involve the use of either stencils or cut-out paper masks of the type which adhere to the surface to be marked. Ordinary stencils suffer from the defect of not producing the most desirable type of legible characters and the paper mask system suffers from the defect of requiring extra time of the craftsman to return to the job when the paint has set and peel off the masks and trim up the work. Also, the paper mask system is relatively expensive in

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that the lettering masks can be used only once and must then be discarded.

The ordinary silk screen process, requiring a rigid frame on which the silk is stretched taut and then tacked in place, is not adaptable for printing on curved surfaces nor for use with relatively small frames where there would be considerable difficulty in stretching and tacking the fabric. According to the present invention, a relatively small silk screen printing apparatus can be provided, which can be flexible so that it can substitute for a stencil or a paper mask, and this apparatus is produced according to a method of the invention which facilitates easy manufacture of such small frames.

References is now made to the drawings.

In Fig. 1, illustrating one preferred embodiment of an apparatus of the present invention, the numeral 2 indicates a piece of silk or the like of the type used in the silk screen process. It is generally rectangular in form and is shown as already having applied to it the usual cut-out film, leaving a section of the screen pervious to paint or ink in the shape of a particular indicium, in this case the number "4." At each of the opposite ends of the piece of silk there is cemented, or otherwise adhered or fixed to it, a rigid framing element. These elements, shown as 4 and 6, are conveniently made of thin metal but can be made of wood, plastic, or other suitable material. Means are provided to urge the ends of the silk in opposite directions to maintain the silk taut, as required in the silk screen printing process, these means being illustrated in perhaps their simplest preferred embodiment as a piece of spring wire 8 having loops 10 and 12 at the ends thereof adapted to engage hook-like lugs 14 and 16, respectively, conveniently formed by being punched out of the metal strips 4 and 6, respectively. The lugs are preferably provided with a short section 18 extending at right angles to the plane of the framing elements and a second section 20 extending generally parallel to the plane of the framing elements.

The spring wire 8 has a central arcuate portion 22 and lying generally in a plane transverse to the plane of the framing elements 4 and 6 and two end portions, designated as arms 24 and 26, lying generally in the plane of the framing elements and terminating, respectively, in the aforementioned lug-engaging loops 10 and 12. The spring wire 8 is of such a size and is so preformed that it tends to urge apart the ends of the arms 24 and 26, thus urging the framing elements 4 and 6 in opposite directions, maintaining tension on the silk 2 to keep it taut. The lugs 14 and 16 are located centrally of the width of the silk screen so that the screen is maintained evenly stretched.

The arcuate portion 22 of the spring wire 8 is substantially as remote from the longitudinal center line of the rectangle of silk as is the long edge of the rectangle, so that it does not interfere with access of the usual squeegee to the indicia appearing on the silk screen.

In using the apparatus in Fig. 1 to print on a flat surface, the device can be held flat against the surface by pressing a thumb and finger against each of the loops 10 and 12. While so held, the silk screen is ready to receive a squeegee and a supply of paint or other coloring agent in the usual manner. The portion 22 of the spring wire 8 serves as a convenient handle or bail to lift off the device from the surface being printed. If desired, the device can be held in place on the surface to be printed by the use of pressure-sensitive tape or the like.

In Fig. 2 there is shown the use of several examples of the device of Fig. 1 in the process of printing several characters in one operation on a curved surface such as a length of pipe, a portion of an automotive vehicle body, or the like. The several silk screen devices are placed in the desired position on the object to be printed, preferably with a slight overlap as shown at 28 to avoid accidental printing of a line between adjacent screens. Conveniently, the group of screens can be held in their proper relative positions by the use of masking tape 30 or the like. With the screens in position, the paint or other printing material is applied in the usual manner with a squeegee 34. The remarkable flexibility of these screens enabling them to be used on curved surfaces even of relatively small radius of curvature, is due to the fact that there are no framing elements whatever along two of the opposite sides of the rectangular piece of silk, and these sides are therefore flexible and free of any rigid restraint.

When it is desired to remove the silk screen from the supporting spring to facilitate cleaning of the screen and storage, one of the framing elements is simply tipped up at an angle to the plane of the screen and the loop of the spring wire is readily disengaged from the lug on the framing element.

The novel method of this invention used to manufacture the silk screen printing unit of Fig. 1 and other embodiments of this invention is illustrated in Fig. 3. To prepare an ordinary rigid rectangular frame of small size adapted for use with a single small-size numeral, for example, is quite difficult inasmuch as it is hard to stretch and tack the silk on such small frames individually and obtain a tight and evenly-stretched screen. To avoid this difficulty, the method of this invention contemplates the use of a conveniently large-size frame from which the smaller ones are made. In carrying out the method, an ordinary size frame 36 is used. This is cut from a piece of plywood or made in any other well known manner of a size which is large enough to make it easy to stretch and tack the silk on it. The silk 38 is then stretched and tacked or otherwise fastened to the frame in the usual manner. To make smaller silk screen printing units, a small frame, such as 39 or 40, of the desired size, is obtained and glued or cemented or otherwise suitably fixed to the silk area in the large frame. Wood, metal, plastic, or the like can be used for these small frames. Fiberboard, such as "Masonite," has been found quite satisfactory and when such material is used in a thickness of about $\frac{1}{8}$ of an inch, the small frame is found to be sufficiently flexible to bend around gently curved surfaces as well as being able to print on flat surfaces. After the cement is dry, the smaller screens are cut from the large screen and are ready for use. The film can be applied to the silk either before or after the small screen is cut from the large one.

As shown at 42 and 44, framing elements of the type used in the embodiment of Fig. 1 can also be used in the method of this invention instead of conventional rectangular framing elements. The framing elements can be adapted to frame one character or can be large enough to accommodate a plurality. In manufacturing devices as shown in Fig. 1, the screen is prepared by applying to the tightly-stretched silk the usual process film in the ordinary manner. That is, the letters or other characters have been cut and peeled from the backing sheet of the process film, the film is then adhered to the bottom of the screen, and the backing sheet is peeled off. Either prior to the application of the film to the silk or subsequent thereto, the framing elements 42 and 44 are cemented to the silk and thereafter the appropriate portion of the silk is cut out from the large screen. If desired, the indicia alone can be cut from the screen and the framing elements fastened afterwards to the cut-out piece of silk bearing the indicia.

While the preferred embodiment of the apparatus illustrated in Fig. 1 shows the section of silk in a rectangular form with two opposite ends provided with rigid framing elements, this arrangement is apparently only one specific example of the broad concept of the invention. The invention comprehends, also, the use of other shapes of sections of silk and other arrangements for rendering the printing area pliable to fit curved surfaces while maintaining it uniformly stretched. Silk sections in the shape of trapezoids, for example, are usable as well as polygons with curvilinear sides. The primary requirements are that the rigid framing elements be of such dimensions and so located on the silk that the silk is uniformly stretched and yet the device is pliable enough to bend on curved surfaces to be printed. In general, this requires that at least one side of the silk section be flexible and free of any rigid restraint. Thus, it is possible to use a U-shaped frame which can be, if desired, made of a base framing element to which are rigidly fixed at right angles two other framing elements. With such a U-shaped arrangement, the side of the silk polygon extending across the top of the U is left free of any rigid restraint. Similarly, the framing elements can consist of two arms joined together pivotally or rigidly, to form a V-shaped area spanned by the silk. When the framing elements are pivoted in a V arrangement, the device assumes the appearance of a collapsible fan. When the fan-type construction is used, resilient means can be included for urging the two arms apart or they can be omitted and the arms can be pushed apart by the craftsman by hand to keep the silk taut. Devices with such V-shaped frames particularly suited for printing on conical surfaces.

While, in the embodiment of Fig. 1, the resilient means for urging the framing elements apart to uniformly stretch the silk is shown simply as a piece of spring wire engaged at both ends with single, centrally placed lugs on the framing elements, any other type of resilient means will serve the purpose of the invention so long as they maintain the silk in the proper taut condition. The resilient means can be connected to the framing elements to urge them apart at more than one location. For example, in the embodiment of Fig. 1, two lugs could be used at each end of the silk section so long as the resultant force was applied along the center line of the area of silk being stretched.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A device of the character described comprising a generally rectangular piece of silk or the like of the type used in the silk screen process; a first rigid member substantially the width of the rectangular silk fastened to the silk at one end thereof across its width; a second similar rigid member fastened across the width of the silk at the other end of the rectangle; a spring for maintaining the screen in tension by urging the two rigid members in opposite directions, including a first arm lying generally in a plane parallel to the plane of said first rigid member, a second arm similar to said first arm and lying generally in the plane of said first arm, and an arcuate portion joining said arms and urging them apart and lying generally in a plane transverse to the plane formed by said silk and said rigid members and passing over said plane in a region substantially at least as remote from that center line of said rectangle which is transverse to said rigid member as is the edge of said rectangle parallel to said center line; and means on said rigid member lying generally on said center line of said rectangle engaged by said arms of said spring whereby said spring urges said rigid elements in opposite directions to maintain said silk in tension.

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2. The device of claim 1 wherein the free ends of said arms of said spring are provided with loops and said rigid members are provided with hook-like lugs adapted to be engaged by said loops, whereby said spring detachably engages said rigid members.

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