July 5, 1960 M. S. MALEK 2,943,565

SILK SCREEN PRINTING DEVICES AND METHOD OF MANUFACTURING SAME

Filed May 21, 1953 3 Sheets-Sheet 1

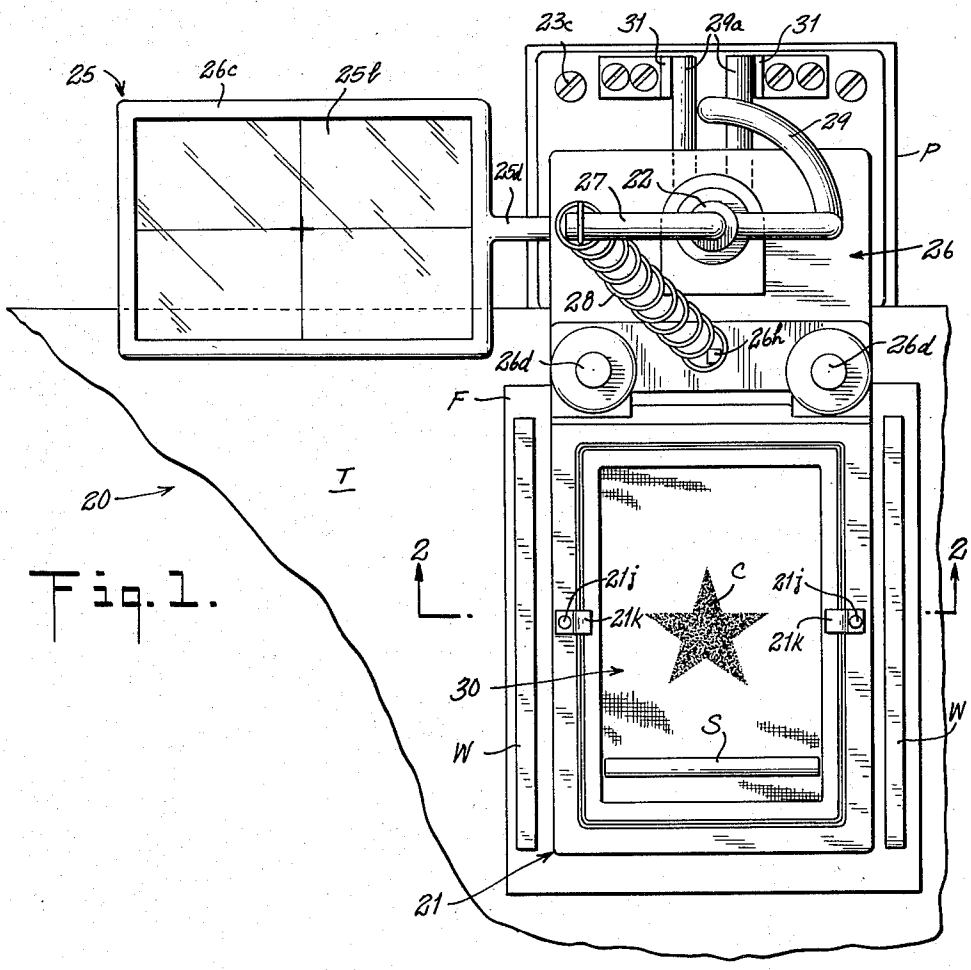


Fig. 1.

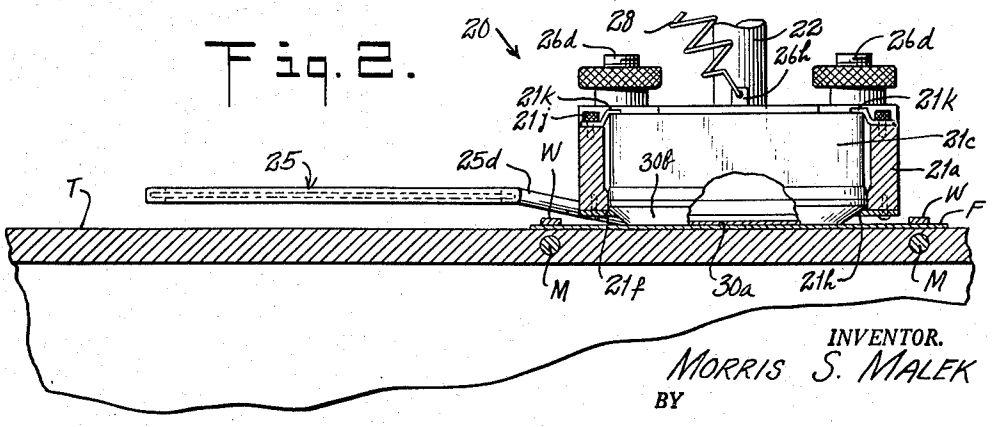


Fig. 2.

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Fig. 10.

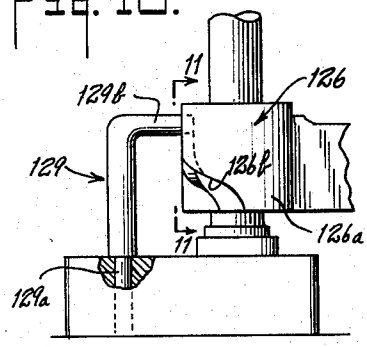
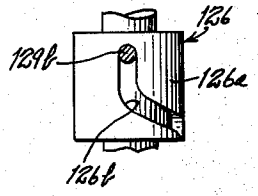


Fig. 11.



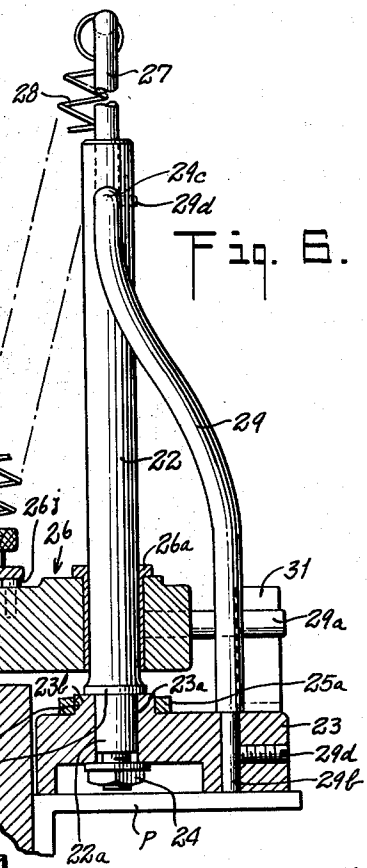


Fig. 6.

Fig. 7.

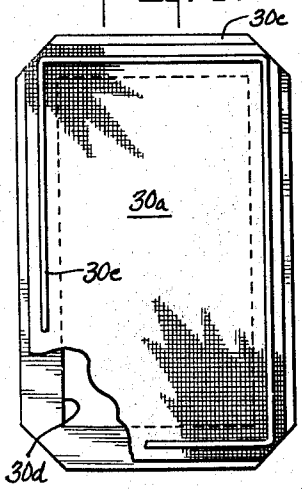
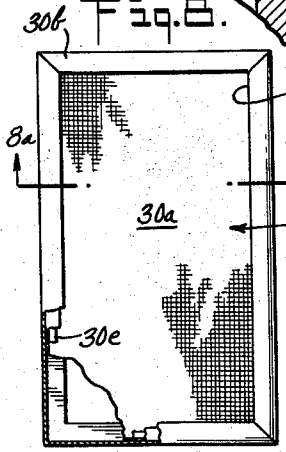


Fig. 8.



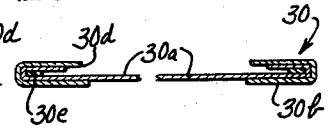
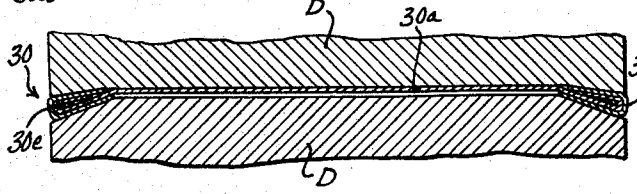


Fig. 8a.

Fig. 9.



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Fig. 3.

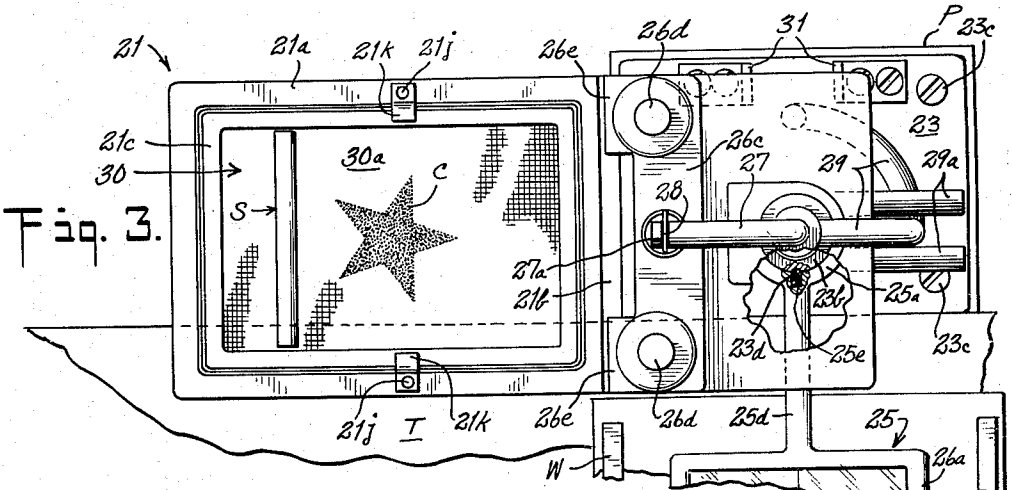
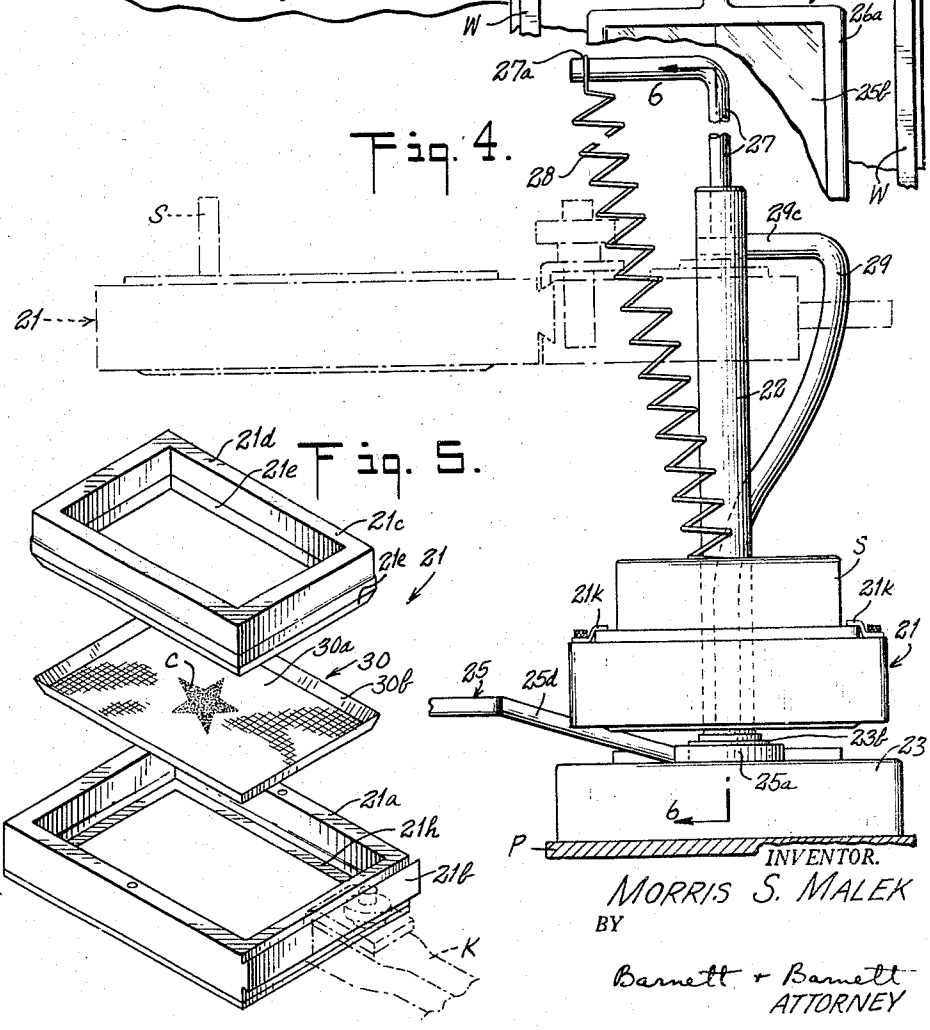


Fig. 4.



United States Patent Office 2,943,565 Patented July 5, 1960

2,943,565

SILK SCREEN PRINTING DEVICES AND METHOD OF MANUFACTURING SAME

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Filed May 21, 1953, Ser. No. 356,390

2 Claims. (Cl. 101—127.1)

This invention relates to silk screen printing devices and more particularly is directed to improvements in silk screen stencil carrier unit constructions, a method of manufacture of such unit constructions, and a supporting frame and work registering base mounting for printing on fabric by silk screen methods.

Among the objects of the invention is to generally improve devices of the character described for printing designs in one or more colors on fabric and to provide a silk screen stencil carrier unit of novel construction, an improved method of manufacturing same for use in combination with an improved supporting frame and work registering base mounting, which carrier unit shall be simple in construction, relatively cheap and easy to manufacture and assemble by a novel and improved method, which shall be rugged yet light in weight, which carrier unit construction shall facilitate storing for future use in a compact nested condition and be readily mountable and demountable in a supporting frame, which frame shall provide means for ready interchangeable mounting of the novel silk screen stencil carrier units, which supporting frame shall be practical and efficient for use in quantity printing in combination with the work registering base mounting on a commercial scale and also for use with a handle support in the home as a hobby, which work registering base mounting shall be capable of supporting the stencil carrier unit in proper alignment on the work in paint, ink or dye applying position and counterbalanced for displacement upwardly and laterally to a position clearing the work table, which shall incorporate a simple but accurate means for laying out and retaining the work in proper register with the stencil carrier designs for printing.

Other objects of the invention will in part be obvious and in part hereinafter pointed out.

The invention, accordingly, consists of features of construction, combinations of elements, arrangements of parts and steps of a method of manufacture which will be exemplified in the apparatus and the method hereinafter described and of which the scope of the application will be indicated in the claims following.

In the accompanying drawing in which possible illustrative embodiments of the invention are shown,

Fig. 1 is a plan view of supporting frame and work registering base having parts mounted and counterbalanced for clearing the operational steps and showing the improved silk screen stencil carrier assembly embodying the invention in an effective position for printing on fabric by silk screen method.

Fig. 2 is a cross-sectional view taken on line **2—2** in Fig. 1 showing details of the interior structure of the work table top, supporting frame and work registering base, and the improved silk screen stencil carrier, portions of the work base and stencil carrier being broken away to expose the cooperative assembly thereof.

Fig. 3 is a plan view similar to Fig. 1 showing registering base and stencil carrier assembly moved in a counterbalanced position for clearing the work table top during the operational steps.

Fig. 4 is a front elevational view showing in full lines the supporting frame and work registering base and stencil carrier assembly in position corresponding to that shown in Fig. 1 with the table removed; and in dotted lines, said assembly being in the counterbalanced position corresponding to that shown in Fig. 3.

Fig. 5 is an exploded perspective view of the improved silk screen stencil carrier aligned for assembly between the open-sided outer and inner boxes of the supporting frame before assembly.

Fig. 6 is a cross-sectional view taken on line **6—6** in Fig. 4 showing details of the counterbalance of the supporting frame but with the stencil carrier in operative position between open-sided outer and inner boxes of said frame assembly on the work table top.

Figs. 7, 8, 8*a* and 9 are views of the successive steps in the improved method of manufacturing the silk screen stencil unit construction embodying the invention, Fig. 7 showing the parts thereof superimposed before bending, Fig. 8 showing the silk screen layer stretched about the stiffening ring and clamped by the inturned rim border of the framing member as shown in cross-section in Fig. 8*a*, and Fig. 9 showing the inwardly tapered contour provided, said framing member being formed between mating dies.

Fig. 10 is a fragmentary side elevational view of a camming modified form of base counterbalancing construction for the improved frame and work registering base embodying the invention, and

Fig. 11 is a cross-section taken on line **11—11** in Fig. 10 showing details of a portion of said camming modification form.

Referring in detail to the drawing, **20** denotes an improved frame and work registering base fitted with a stencil carrier unit supporting frame assembly **21** constructed to embody the invention which, as shown in Figs. 1, 2 and 6, for commercial or professional purposes may be mounted on a suitably sunken or depressed horizontally disposed platform P rigidly positioned at a level below a horizontally extending work table top T.

Upstanding vertically from platform P, there may be provided a cylindrical mast or stanchion **22** having a lower end **22***a* firmly anchored to extend through a shouldered socket fitting portion **23***a* of a suitable support, such as, base member **23**, the latter being rigidly secured to platform P in any suitable manner by spaced apart screws **23***c*, said stanchion end **22***a* terminating in lock washer and clamping nut **24** in recessed relation into the underside of said base member **23**. Said shouldered socket fitting portion **23***a* may be provided with an upstanding boss **23***b* of circular cross-section which not only serves as an abutment for a peripherally extending swivelling flange **22***b* of stanchion end **22***a* but also accommodates a pivoting end ring **25***a* of a radially swingable design aligning framer **25**.

Mounted for movement up and down along and rotation about stanchion **22**, there is provided a rider block **26** having a bearing liner **26***a*. Said rider block **26** may have a suitable coupling extension end **26***b*, and, as shown in Figs. 1, 2, 3 and 6, includes an angle clamp jaw plate **26***c* releasably retained to said extension end **26***b* and against spaced apart levelling headed pins **26***j* by spaced apart threaded studs and finger screws **26***d*.

Each jaw end **26***e* of said clamp jaw plate **26***c* may extend part way down along a vertical side terminating block coupling extension end **26***b*, and may be formed with a chamfered surface **26***f* extending in a downwardly direction, said block coupling extension vertical side end **26***b* being provided with a coacting chamfered edge surface **26***g* extending in an upwardly direction and spaced

from said block extension chamfered surface **26***f* so that when finger screws **26***d* tighten clamp plate **26***c*, said chamfered edge surfaces **26***f* and **26***g* provide a dovetail form of jaw construction for rigidly coupling with dove-tail projection **21***b* of outer open-sided box **21***a* of stencil carrier unit supporting frame **21**, for example, as shown in dotted lines in Fig. 4 and in full lines in Fig. 6.

For counterbalancing the rider block **26** and stencil carrier unit supporting frame assembly **21** coupled to move up and down along stanchion **22**, the latter may terminate at the upper end or mast head in an L-shaped arm **27** which may be positioned to extend in a direction relative to the length of table top T. Suitable tension means, as for example, a helically wound spring **28** is provided, one end of which engages grooved arm end **27***a*, the other end of spring **28** being anchored to eyelet **26***h* projecting up from rider block **26**, as shown in Figs. 1, 3 and 6.

Swivelling or camming movement of rider block **26** coupled with stencil carrier unit supporting frame assembly **21** about stanchion **22** may be limited and controlled in any suitable manner. As shown in Figs. 1, 3, 4 and 6, for this purpose there is provided a bent guiding rod **29** which is effective to turn said rider block **26** and stencil carrier unit supporting frame assembly **21** a desired angle, here shown as about 90°, from a lowered effective working position of the latter, shown in Figs. 1, 2 and 6, to a counterbalanced raised work clearance position, shown in Figs. 3 and in dotted lines in Fig. 4.

To effect said turning movement about stanchion **22**, rider block **26** has two outwardly projecting pins **29***a* spaced apart to permit free sliding and limited swivelling thereof along said guiding rod **29** so that when said rider block **26** and stencil carrier unit supporting frame assembly **21** are brought into raised or elevated position, counterbalanced against the action of spring **28**, the rider block **26** and stencil carrier unit supporting frame assembly **21** automatically swing in a relatively right angle relation.

Guiding rod **29** may have opposite ends thereof rigidly supported and, as seen in Fig. 6, are neatly fitted into base member **23** and the upper end portion of stanchion **22** at **29***b* and **29***c*, respectively, said ends being firmly secured by suitable means, such as, set screws **29***d*.

Stencil carrier unit supporting frame assembly **21**, as is clear from Figs. 1, 2, 4 and 5, besides including outer open-sided box **21***a* also has nested therein inner open-sided box **21***c* between which silk screen stencil unit **30** is neatly fitted to provide a receptacle having a top open-side **21***d* into which paint, dye or ink is introduced for spreading by a squeegee S. The latter may have a handle H and flexible blade B for resiliently bearing against horizontally disposed silk screen **30***a* of stencil unit **30** of supporting frame **21**. Said screen **30***a* may be provided with a desired design configuration C, such as, foor example, a star shown in Figs. 1, 3 and 5, prepared and provided on said screen **30***a* in the well understood manner.

The improved construction and manufacture of silk screen stencil unit **30** is a feature of the invention. Said stencil screen unit **30**, as shown in Figs. 7, 8, 8*a* and 9, may be constructed with a relatively continuous stiff perimetrically extending rim border **30***b* formed to provide a dished structure. To that end, the following method of manufacture has been found to give satisfactory results.

A flat sheet or layer, such as, sheet metal, suitable plastic or material of similar stiffness, may be cut to a pattern contour blank **30***c* having a central through-opening **30***d*, as shown in Fig. 7. On said cut blank **30***c* is superimposed silk screen **30***a* positioned to lie over said opening **30***d*. On said silk screen **30***a*, a bracing ring **30***e* may be superimposed to extend throughout the mid-portion of blank **30***c* between the rim edge of through-opening **30***d* and outer or contour rim edge thereof. As shown in Figs. 8 and 8*a*, the rim border of blank **30***c* together with rim border of silk screen **30***a* may then be folded over to clamp bracing ring **30***e* in any suitable manner for retaining silk screen **30***a* in a frame.

The silk screen unit structure thus partially finished may be placed between a pair of mating dies D in a press or vise (not shown) where the rim border **30***b* is given a desired dish-shape for use with outer box **21***a* and inner box **21***c* as an assembly **21** and simultaneously tautly stretching the silk screen **30***a* against stress and strain of blade B of squeegee S in spreading paint, dye or ink thereover, as is clear from Figs. 6 and 9.

In order that the above described silk screen stencil unit **30** may be fitted and assembled for proper operation between inner open-sided box **21***c* and outer open-sided box **21***a*, the latter may be provided at the bottom with an inwardly extending flange either formed integrally therewith or, as here shown, formed as a strip or ring **21***f* secured in any suitable manner, as by spaced apart screws **21***g* to the bottom edge surface of outer-open-sided box **21***a*, said strip or ring **21***f* being inwardly extended and having a chamfered surface **21***h* to conform to the underside of rim border **30***b*, as is clear from Figs. 2 and 6. The bottom of inner open-sided box **21***c* is provided with a gasket **21***e* of rubber or other suitable material having a down and insloping surface conforming to the upper side of rim border **30***b* of unit **30** to form a liquid-tight seal or joint. Outer open-sided box **21***a* and inner open-sided box **21***c* with silk screen stencil unit **30** nested therebetween may be interlocked in any suitable manner, as for example, with a threaded stud and finger screw **21***j* operating a clamping plate **21***k* on opposite sides of outer open-sided box **21***a*.

Design aligning framer **25** may be formed with a transparent window **25***b* of any suitable material, such as, a plastic sheet similar in size and shape to silk screen stencil unit **30**. Said window **25***b* may have a stiffened casement **25***c*, and, as is clear from Figs. 1, 2, 3, 4 and 6, is horizontally disposed in parallel relation to freely swing on arm **25***d* which interconnects casement **25***c* with pivoting end ring **25***a* between the frame assembly **21** and work table top T. Suitable top means is provided for releasably retaining design aligning framer **25** in its fabric aligning operative position above table top T shown in Fig. 3. Such stop means may comprise a spring pressed ball **25***e* extending inwardly from end ring **25***a* and notch **23***d* formed in the side of upstanding boss **23***b*, as shown in Figs. 3 and 6.

Transparent window **25***b* may be provided with suitable hairlines for aligning designs corresponding to configuration C of silk screen **30***a* to print on a fabric F or the like material when spread flat and smooth on table top T in the manner hereinbefore described. Fabric F may be retained in position by suitable means, as for example, bar weights or, as is shown in Figs. 1 and 2, by spaced apart steel strips W which are retained on the fabric F by suitable magnets M positioned to extend through the work table a spaced distance below table top T.

After constructing the parts and assembling same as described above and shown in the drawing, the operation and utility of the invention will be apparent.

Stencil carrier assembly **21** is swung aside in an elevated clearance position and a piece of fabric F or other material to be silk screen printed is spread flat and smooth on table top T. Design aligning framer **25** is then positioned over the fabric F and is held in a predetermined fabric aligning position by spring pressed ball **25***e* engaging notch **23***d*, as is clear from Fig. 3. The region of the fabric F on which design configuration C is to be applied is then brought into proper registry in relation to the hairlines on transparent window **23***b* by simply shifting fabric F on the table top T and then may

be retained in the desired registration position by steel strips W placed thereover or by any other well known means.

Design aligning framer **25** is then swung into clearance position away from fabric F on table top T, as shown in Figs. 1, 2 and 6, and stencil carrier frame assembly **21** swung and lowered to an aligned printing position in close proximity to spread out fabric F on table top T. Now the application of design configuration C can be carried out by simply pouring paint, dye or ink into innner box **21***c* through said open side **21***d* and on manipulating handle H of squeegee S to and fro in inner box **21***c*, blade B works the paint, dye or ink through silk screen **30***a* printing the design configuration C in properly positioned alignment on fabric F.

The improved pan-shaped form of silk screen stencil unit **30** fitted between inner and outer open-sided boxes **21***c* and **21***a*, respectively, reduces to a minimum accidental splashing of the paint, dye or ink during squeegeeing or seeping over the perimeter of said carrier unit frame assembly **21** and thereby eliminates accidental staining of the fabric F.

It should also be noted that with the above described improved construction and arrangement, the silk screen **30***a* is brought into close contact with fabric F and is subjected to less stretching, straining and stress during the squeegeeing transferring of design configuration C to fabric F. The improved construction of stencil unit **30** is not only of simple construction that can be inexpensively manufactured in quantity production but is rugged and can withstand even the roughest or unskilled handling. Said stencil unit **30** because of its dish shape also is adapted to be compactly nested for storage and strengthened for package shipment.

Silk screen stencil units **30** having different design configurations C for printing on fabric F are readily interchangeable by simply releasing finger screws **21***j* and clamping plate **21***k* to remove inner open-sided box **21***c* from carrier unit frame assembly **21**. Then seated stencil unit **30** can be removed through top open-side **21***d* and another unit **30** placed into outer open-sided box **21***a*, preshaped rim border **30***b* serving to self-seat unit **30** on chamfered surface **21***h* of strip or ring **21***f*. Inner open-sided box **21***c* is then replaced and fastened in position by finger screws **21***j* and clamping plate **21***k*, as is clear from Figs. 4, 5 and 6.

Where the nature of the printing requires silk screens **30***a* having configuration C of different sizes or shapes, stencil carrier unit frame assembly **21** can be readily and easily interchanged by simply turning finger screws **26***d* to release angle clamp jaw plate **26***c* so that frame assembly unit **21** may be slipped sideways free of rider block **26** and replaced by an assembly unit of a different size or shape, as is clear from Figs. 4 and 6.

As already above described, stencil carrier frame assembly **21** is counterbalanced by the action of tension spring **28** and swivelling movement of said frame assembly **21** with rider block **26** on up and down movement of the latter on stanchion **22** taking place by the camming effect of pins **29***a* riding on guiding rod **29** so that carrier frame assembly **21** is easily elevated and swung to work table top T clearance, or readily lowered into effective aligning position in the automatic manner described. In the latter position, pins **29***a* may be steadied against lateral movements by providing suitable means, such as, stall forming angle pieces **31** adjustably screw fastened to base support member **23**, between which said pins **29***a* are retained to secure said frame assembly **21** in a predetermined alignment with respect to the hairlines on transparent window **25***b* when design aligning framer **25** is retained in its operative position over work table top T, as is clear from Figs. 1 and 6.

As a modified camming construction for producing the automatic swing and raising or lowering of the supporting frame assembly **21**, in place of guiding rod **29** and pins **29***a* described above, there may be provided as shown in Figs. 10 and 11 for stanchion **22** rider block **126** having a cylindrical portion **126***a* formed with cam follower groove **126***b* into which extends an end **129***b* of an L-shaped guide pin **129**, the latter having its other fitted end **129***a* rigidly mounted in base member **23**. On raising or lowering rider block **126** with counterbalanced stencil frame assembly **21**, the latter is swung into clearance or aligning position in the same manner as described above when the guiding rod **29** and pins **29***a* are used.

As a hobby, the invention may be inexpensively used for non-professional services by merely constructing stencil carrier unit supporting frame assembly **21** with a suitable handle extending from outer open-sided box **21***a* in any well understood manner, as for example, by a handle K provided with suitable clamping jaws for engaging dove-tail projection **21***b*, as shown in broken lines in Fig. 5, without the counterbalancing support described above and manually aligning the design configuration C on silk screen **30***a* to desired portions of fabric F.

The improved steps for manufacturing silk screen stencil unit **30** are shown in Figs. 7, 8, 8*a* and 9 and have been fully set forth above in describing the construction thereof.

It is thus seen that there is provided improved silk screen printing devices and an improved method for manufacturing silk screen stencil units in which the several objects of the invention are achieved and which are well adapted to meet conditions of practical use.

As various possible embodiments might be made in the above invention, and as various changes might be made in the device and method above set forth, it is to be understood that all the matters herein set forth or shown in the accompanying drawings are to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A stencil carrier unit supporting frame assembly of the character described comprising an outer box frame having a bottom side for resting on a horizontal table top formed with a through-opening extending upwardly to a top side, a flange extending inwardly into the opening of the outer box frame bottom side and being formed with an upwardly facing chamfered surface forming a seat, an inner box frame sized for nesting in the through-opening of said outer box frame, an interchangeable dish-shaped silk screen stencil unit having a peripheral border member thereof forming sloping dish sides conforming to said chamfered surface for seating thereon between said outer and inner box frames, said inner box frame having a bottom sealing means for contacting the upper surfaces of the peripheral border member to form a tight joint therebetween so that the silk screen stencil unit serves as a receptacle bottom closure wherethrough a print coloring material is forced, and releasable means for retaining said outer box frame, stencil unit and inner box frame in nested assembly.

2. A stencil carrier unit supporting frame assembly of the character described comprising a stencil screen unit having a relatively rigid border member formed with a central opening, said border member having a fold extending lengthwise about said opening, a porous flexible sheet material spread flat over said opening and having a rim edge thereof extending into said fold and clamped in a stretched taut condition, said folded border member constructed and arranged to slope with respect to the flat spread sheet material extending over said opening providing a dish-shaped structure for said stencil unit and exerting a stretching force on said sheet material, said stencil screen unit being interchangeably assembled between an inner open-ended box frame nested in an outer open-ended box frame, rim edges of said box frames

each having a contour sized to conform to the sloping border member of said dish-shaped stencil unit, said rim edges of said box frames with the sloping border of said stencil unit forming a tight joint so that the screen unit serves as a receptacle bottom closure for said assembly wherethrough a print coloring material is forced, and releasable means for retaining said outer box frame, stencil unit and inner box frame in nested assembly.

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