Aug. 8, 1967 M. L. JAFFA ETAL 3,334,586

VARIABLE HARDNESS SUPPORT FOR SHEET TO BE PRINTED

Filed Feb. 24, 1965

FIG. 1

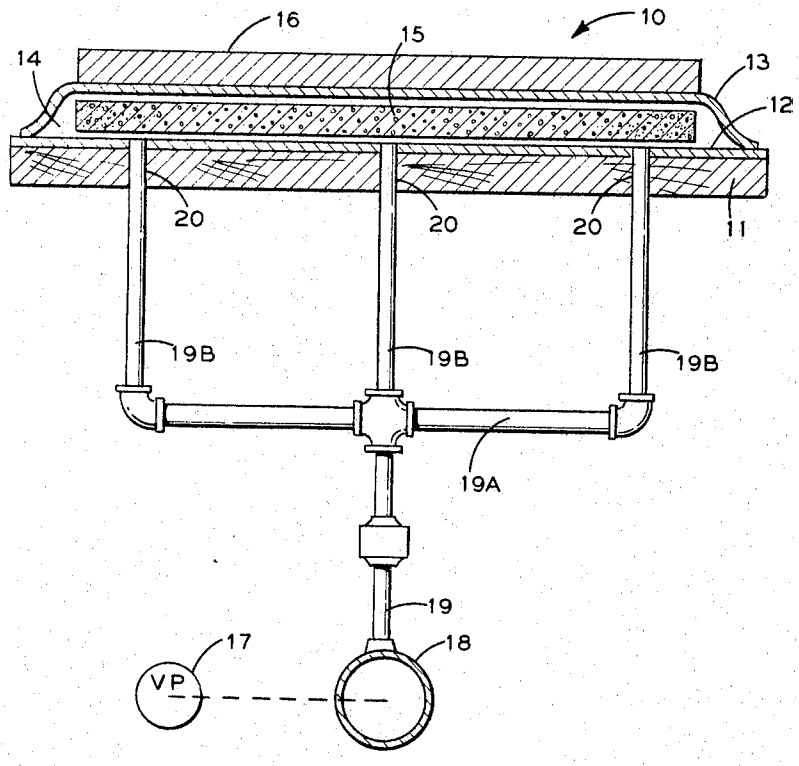
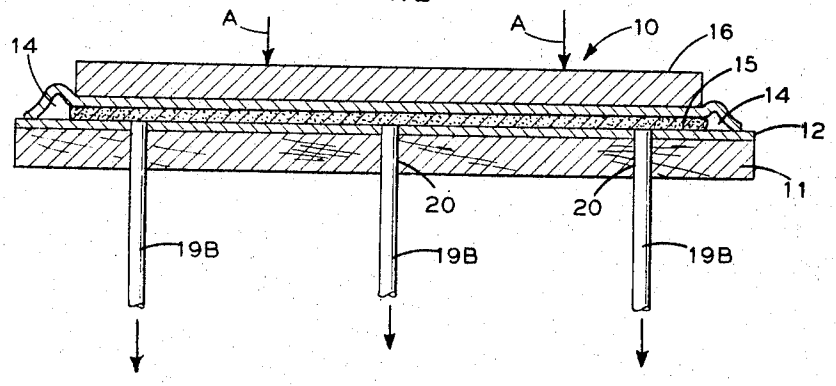



FIG. 2




INVENTORS
Matthew L. Jaffa
David Jaffa
BY
Irving Seidman
ATTORNEY

United States Patent Office 3,334,586 Patented Aug. 8, 1967



# 3,334,586
# VARIABLE HARDNESS SUPPORT FOR SHEET TO BE PRINTED

Matthew L. Jaffa, 92 Clark St., Rutherford, N.J. 07070, and David Jaffa, 38—26 Allwood Place, Fair Lawn, N.J. 07410

Filed Feb. 24, 1965, Ser. No. 434,832
7 Claims. (Cl. 101—407)

This invention relates to a printing surface and more specifically to a screen printing surface in which the hardness or softness of the surface can be varied as desired for obtaining optimum printing results.

In screen printing the hardness or softness of a printing surface on which the screen printing operation is being conducted is very important in the determination of a desired effect or depth of color in the finished screen print. Heretofore, in screen printing it was necessary for the printer to choose between either a hard surface or a soft surface when building or using a screen printing machine or a hand printing table. Thus, the use of a machine or table constructed with either specific hard surface of soft printing surface was limited in its use to that type of printing for which the given printing surface was designed. Consequently, it was heretofore necessary for a printer to have on hand machines and/or tables with a hard printing surface, a soft printing surface or surfaces of intermediate softness or hardness in order to accommodate for both hard and soft screen type printing. Often times it would be desirable to have printing surfaces of various intermediate hardnesses or softnesses. Because a given printer would not normally have on hand a printing surface of all the desired hardnesses or softnesses to attain all the desired color or printing effects, it was necessary for such printer to compromise the desired end results in accordance with the hardness or softness of the printing surfaces on hand. Consequently the optimum results for varying the possible coloring or printing effects were not readily obtainable with the known printing surfaces, unless the printer had on hand a relatively large number of tables or machines each formed with a surface of variable hardness or softness.

It is therefore an object of this invention to provide a printing surface in which the degree of hardness or softness thereof can be varied at will.

It is another object to provide a printing surface in which the degree of hardness or softness of the surface can be obtained by controlling the differential in pressures acting thereon.

It is another object to provide a printing surface of variable hardness or softness which is relatively simple in construction, relatively inexpensive to manufacture and which is positive in operation.

The foregoing objects and other features and advantages of this invention are obtained by a printing surface capable of attaining variable degrees of hardness or softness comprising of a relatively rigid supporting surface on which there is disposed a sheet of relatively deformable or flexible air impervious material to define therewith a collapsible vacuum chamber. Enclosed within the vacuum chamber is a padding or thickness of a readily compressible or porous material. A printing blanket may be disposed over the sheet of impervious sheet material. In accordance with this invention, a source of negative pressure, as for example a vacuum pump or the like, is connected in communication with the vacuum chamber by a suitable connecting conduit so that a vacuum may be drawn on the vacuum chamber as desired. The arrangement is such that when the vacuum is drawn by operation of the negative pressure source, the force of



the atmospheric air acting externally of the vacuum chamber defined will cause the padding material in the vacuum chamber to be compressed thereby varying the hardness or softness of the printing surface accordingly.

A feature of this invention resides in the provision of a printing surface comprising of a readily deformable vacuum chamber in which there is enclosed a compressible material that is readily compressed to the desired degree of hardness or softness by the external atmosphere acting thereon depending upon the degree of vacuum that is pulled on the vacuum chamber.

Another feature of this invention resides in the provision of a printing surface in which the degree of hardness and/or softness thereof can be infinitely controlled between the maximum softness and maximum hardness of the compressible material so as to obtain the optimum printing surface for attaining the desired end results or effects.

Still another feature of this invention is to provide a common printing surface which is particularly adapted to perform both hard and soft screen printing.

Other features and advantages will become more readily apparent when considered in view of the drawings in which:

FIGURE 1 illustrates a cross-sectional view of the printing surface of the instant invention illustrated in its maximum soft position.

FIGURE 2 is a cross-sectional view of the printing surface similar to that shown in FIG. 1, but illustrating the arrangement thereof in its maximum hard position.

Referring to the drawings, there is shown the improved printing surface **10** of the instant invention. The printing surface **10** disclosed is particularly adapted for use in the screen printing art. Accordingly, the surface **10** to be herein described can be readily adapted to a screen printing machine or to a hand printing table.

In screen printing it is possible to create different desired effects for particular colors depending upon the hardness or softness of the printing surface on which a screen printing operation is being performed. Heretofore, it was necessary for a printer to choose between either a hard surface or a soft surface prior to performing the screen printing operation depending upon the desired end effect or depth of color desired. In accordance with this invention, there is provided an improved screen printing surface **10** in which hardness or softness of the printing surface can be readily varied at will so as to obtain the optimum results for a given effect or depth of color. Also, with the instant invention it is possible to create different surfaces at varying points along the printing surface so that each color can have the necessary degree of hardness or softness required to produce the desired effect or a particular color.

Referring more specifically to the drawings, there is shown therein a relatively rigid support member or top **11** which constitutes the backing or table support of the printing surface **10** to be described. In the illustrated embodiment a layer of smooth, hard, air impervious material, as for example, a laminated plastic material, such as Formica **12**, is disposed in overlying relationship to the top of the rigid support member **11**. Accordingly, there is disposed in overlying relationship to the support member a sheet of relatively thin flexible or deformable air impervious material or cover **13** of such non-porous material such as polyethylene, Mylar, or vinyl. Accordingly, the cover **13** or sheet of non-porous material is substantially co-extensive in length to the length of the printing surface in which the peripheral or marginal portion of the flexible sheet **13** is suitably secured to the supporting surface by any suitable means so as to define an air tight vacuum chamber **14** between the table top **12** and the sheet **13** of the deformable material.

Encased within the vacuum chamber **14** there is provided a layer of compressible material or padding **15** which is substantially co-extensive with the top of the table support member. Accordingly, the padding material **15** may comprise of any spongeable or readily compressible material, such as foam rubber, sponge, polyurethane, felt or any other open or cellular type material. The printing blanket **16** is then positioned in superposed relationship with the upper surface of the deformable sheet material **13**, the printing blanket **16** forming the surface on which the material to be screen printed is rested during a screen printing operation.

In accordance with this invention, a means is provided for drawing a vacuum on the vacuum chamber **14**. In the illustrated embodiment, the means comprises a source of negative pressure, as for example a vacuum pump **17**, which has its inlet connected to a manifold **18** to which one or more conduits **19**, **19A**, **19B** are suitably connected in communication with port openings **20** formed in the bottom of the rigid supporting member **11**. Accordingly, the conduits **19B** are connected in open communication with the vacuum chamber **14**.

The arrangement is such that whenever the source of negative pressure **17** is rendered operative, the suction created thereby tends to withdraw the air from within the vacuum chamber **14**, thereby resulting in a negative pressure occurring within the vacuum chamber **14**. The atmospheric pressure thus acting externally of the vacuum chamber as indicated by arrows A causes the vacuum chamber **14** and the padding material **15** therein to be compressed as indicated in FIG. 2. Depending upon the degree of vacuum which is pulled on the chamber **14**, the hardness or softness of the compressible material **15** is varied accordingly.

As shown in FIG. 1, the maximum softness of the printing surface **10** described is established primarily by the normal hardness or softness of the compressible material **15** disposed within the vacuum chamber **14**. It will therefore be apparent that as the degree of vacuum pulled on the vacuum chamber is increased, the hardness of the compressible material **15** is increased accordingly. Thus, the atmospheric air pressure acting externally on the chamber **14** compresses the padding material **15** so that maximum hardness is obtained when a minimum negative pressure is created in the vacuum chamber **14**.

From the foregoing, it will therefore become readily apparent that a printer may vary the desired degree of hardness or softness of the printing surface **10** described, to obtain the optimum end results or effects desired for any particular screen printing operation and/or color effect. Thus, it will also be noted that the degree of hardness or softness of the printing surface **10** defined can be infinitely controlled between the maximum softness position as indicated in FIG. 1 and the maximum hardness position as indicated in FIG. 2, merely by controlling the degree of vacuum which is pulled on the vacuum chamber **14**. Consequently, with a single printing surface of the type herein described, a printer may obtain all of the desired effects and color variations desired for any degree of hardness or softness, which was heretofore not obtainable with a single or common screen printing surface.

While the instant invention has been described with reference to a particular embodiment thereof, it will be readily appreciated and understood that variations and modifications of the invention may be made without departing from the spirit or scope of the invention.

What is claimed is:

**1.** A printing surface of variable hardness comprising:

(a) a rigid backing member,

(b) imperforate, air impervious means defining a deformable vacuum chamber impervious to a pulled vacuum thereon supported on said backing member,



(c) a compressible padding means disposed between said backing member and imperforate, air impervious means so as to be confined within said vacuum chamber,

(d) and means for drawing a vacuum on said chamber causing the atmospheric pressure acting externally on said deformable vacuum chamber and padding means therein to compress so as to vary the hardness of the printing surface defined thereby in accordance with the degree of vacuum pulled on said vacuum chamber.

**2.** A means for varying the hardness of a printing surface comprising:

(a) a rigid supporting surface,

(b) means in the form of a compressible mat overlying said supporting surface,

(c) an air impervious flexible sheet of material overlying said mat to form an enclosure encasing said mat between said supporting surface and said flexible sheet,

(d) and means connected in communication with said enclosure for evacuating the air from said enclosure whereby said mat is compressed by the external atmospheric pressure acting thereon to vary the hardness of said mat in accordance with the degree of vacuum pulled on said enclosure.

**3.** The invention as defined in claim **2** and

said latter means including a conduit connected in communication with said vacuum chamber,

and a source of negative pressure connected to the other end of said conduit for creating the vacuum on said enclosure.

**4.** The invention as defined in claim **2** wherein said mat is formed of cellular material.

**5.** The invention as defined in claim **4** and including:

a printing blanket overlying the sheet of air impervious material.

**6.** A printing surface for printing a design on a sheet of material comprising:

(a) a smooth flat table top surface,

(b) an imperforate sheet of readily deformable air impervious material overlying said table top surface,

(c) means for securing the marginal portion of said sheet of air impervious sheet material to said table top surface, said sheet so secured being impervious to a pulled vacuum thereon to define therebetween a vacuum chamber,

(d) a pad of readily compressible material overlying the area of said table top surface within said vacuum chamber,

(e) and means for drawing a vacuum on said chamber so that as the vacuum on said chamber is drawn, the external pressure acting on said air impervious sheet causes said vacuum chamber and compressible padding therein to compress toward said rigid table top surface to thereby vary the hardness of the printing surface in accordance with the vacuum drawn.

**7.** A variable printing surface comprising:

(a) a rigid table top,

(b) a laminate of smooth, flat, air impervious material connected to said table top to define a rigid support,

(c) a thickness of a compressible padding overlying said laminate,

(d) an imperforate sheet of readily deformable air impervious material covering said compressible padding,

(e) means for securing the peripheral portions of said sheet to said rigid support to define an enclosed vacuum chamber impervious to a vacuum pulled thereon about said padding,

(f) and means for drawing a vacuum on said chamber whereby the atmospheric pressure acting on said sheet material causes said padding to be compressed in

accordance to the degree of vacuum drawn on said chamber,

(g) said latter means including a conduit connected in communication with said vacuum chamber,

(h) and a source of negative pressure connected to the other end of said conduit for creating the vacuum on said chamber,

(i) and a printing blanket overlying said deformable sheet.



**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,426,471 | 8/1922 | Fussell | 101—407 X |
| 2,956,769 | 10/1960 | Sigler et al. | 248—363 |
| 3,126,192 | 3/1964 | Stein | 248—362 |

ROBERT E. PULFREY, *Primary Examiner.*

H. P. EWELL, *Assistant Examiner.*