

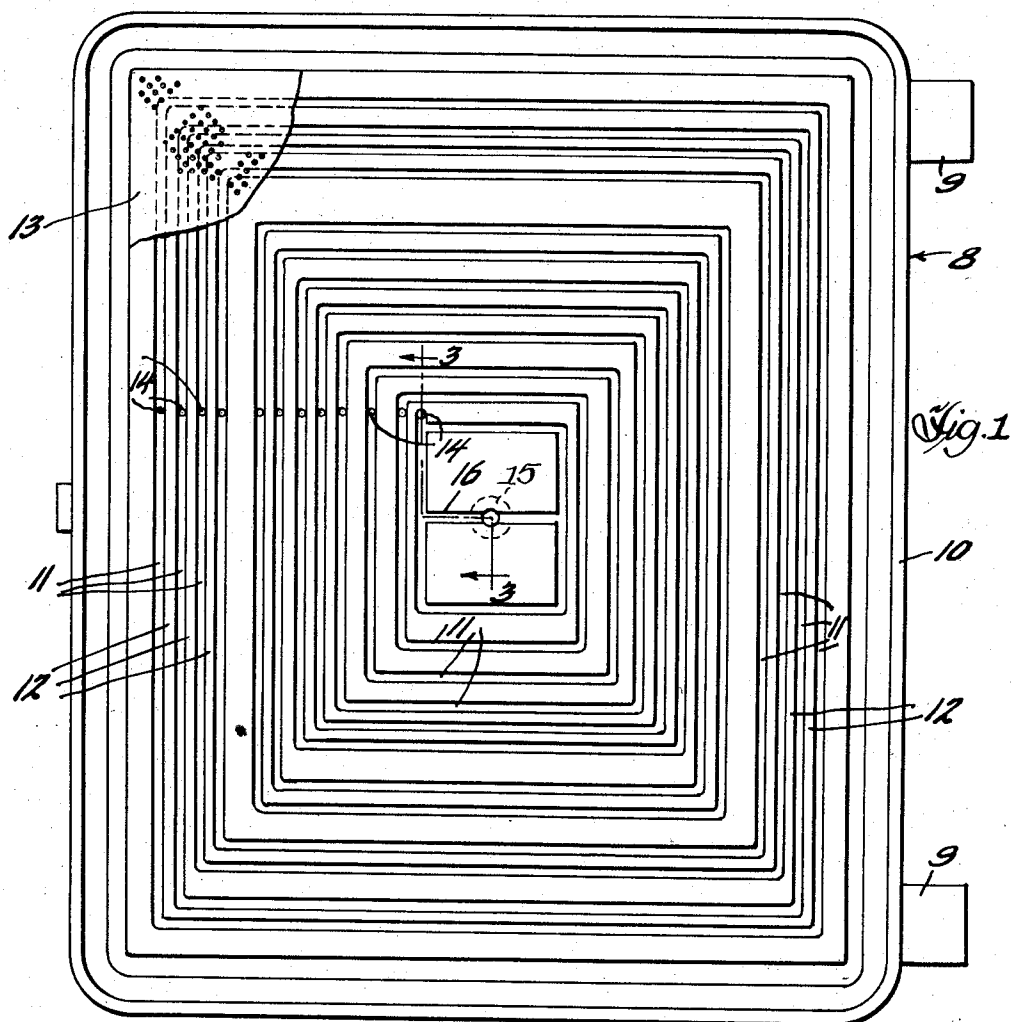
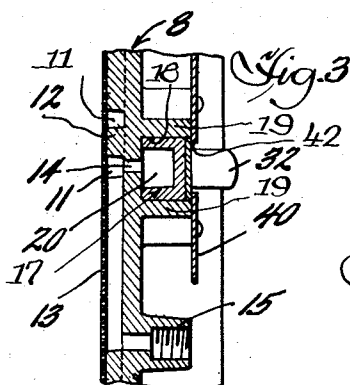
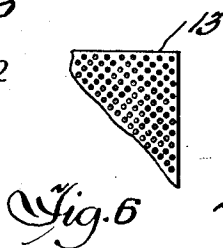
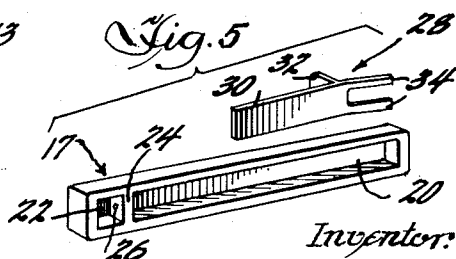
July 21, 1959

D. T. BLATHERWICK
VACUUM FILM SUPPORT

2,895,706

Filed Feb. 14, 1955

2 Sheets-Sheet 1



Inventor:

Delbert T. Blatherwick
By: Schneider & Dressler, Attys.

By: Schneider & Dressler, Attys.

July 21, 1959

D. T. BLATHERWICK

2,895,706

VACUUM FILM SUPPORT

Filed Feb. 14, 1955

2 Sheets-Sheet 2

Fig. 2

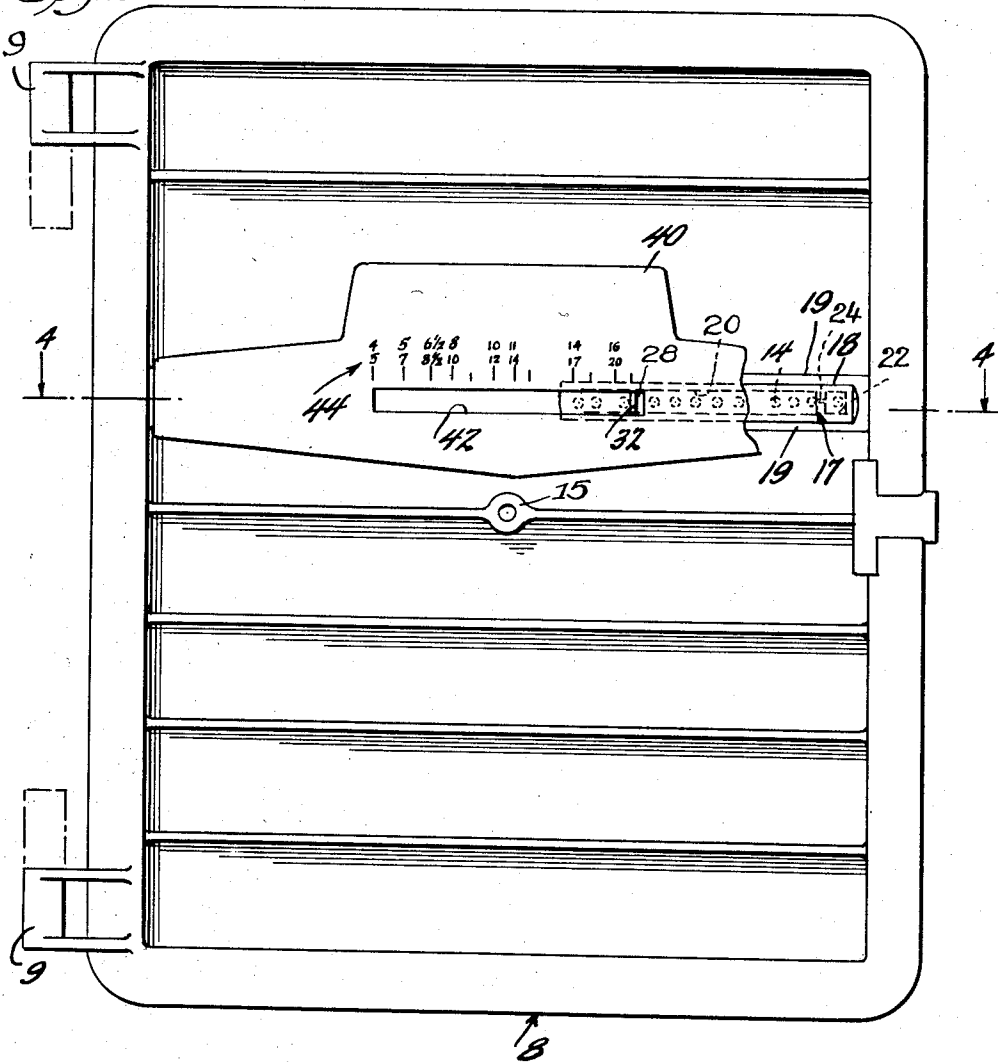
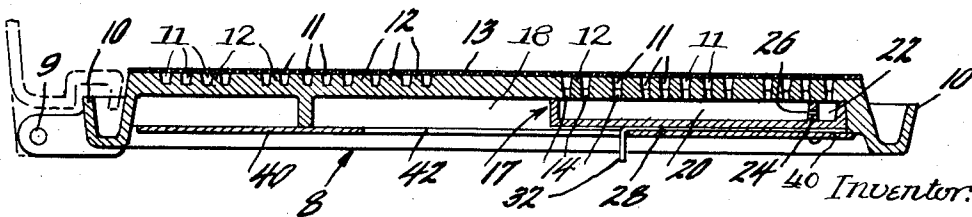


Fig. 4

Inventor:
Delbert T. Blatherwick
By: Schneider & Dressler, Attys.

1

2,895,706

VACUUM FILM SUPPORT

Delbert T. Blatherwick, Chicago, Ill., assignor to Robertson Photo-Mechanix, Inc., a corporation of Illinois

Application February 14, 1955, Serial No. 488,001

7 Claims. (Cl. 248—363)

This invention relates to vacuum supports for sheets or films, particularly of the type used in large cameras.

In large cameras, or in photostat apparatus, it is necessary to hold large sheets of photographic film, or photosensitive paper of various widths, perfectly flat and smooth against a support. The suction or vacuum devices as hitherto used for this purpose have either been inadequate in the performance of the required functions or have involved the use of costly materials and methods of manufacture.

The present invention overcomes these difficulties by the provision of simple, and inexpensive equipment, easily constructed, and at the same time capable of holding a sheet or film flat and smoothly in place while localizing the area to which suction is applied to substantially the area covered by the sheet or film. Further objects and advantages of the improvement will appear from the following detailed description, and the features of novelty will be particularly pointed out in the claims.

In the drawings illustrating the invention,

Fig. 1 is a front elevation of a film or sheet support illustrating the face of the support against which the film or sheet is held; a portion of the support being broken away;

Fig. 2 is a rear elevation of the support, a part being broken away for the sake of clearness;

Fig. 3 is an enlarged fragmental sectional elevational view, the section being taken along line 3—3 of Fig. 1;

Fig. 4 is a sectional plan view, the section being taken along line 4—4 of Fig. 2;

Fig. 5 is an exploded detail perspective view illustrating the adjustable valve device; and

Fig. 6 is a fragmental detail elevational view illustrating the perforated plate against which the sheet or film is held.

Referring in detail to the drawings, the film supporting element, indicated generally as 8, comprises a backing plate which may preferably be hinged at 9. Plate 8 is provided with a peripheral flange 10, forming a light seal with the camera housing. The front face of the plate is formed with a series of concentric grooves 11 separated by ridges 12. The backing plate 8 with the ridges 12 may be and preferably is cast as a unit from aluminum or other suitable material. A finely and uniformly perforated, thin plate or grid 13 is attached to the outermost of the ridges 12, suitably by cementing, so as to avoid leakage of air on application of suction to the back, and lies on the upper surfaces of the inner ridges separating the channels or grooves 11. A source of suction communicating with the grooves and perforations of the plate serves to hold a film or sheet perfectly flat against the plate as will hereinafter appear.

Grooves 11 are provided with perforations 14 passing therethrough to the rear face of the plate. Perforations 14 are arranged in a linear series adapted to communicate with a source of suction, not shown. An interiorly threaded boss 15, best shown in Fig. 3, bored to communicate with an interior cross groove 16, provides means

2

whereeto a suitable tube or pipe may be attached. Through this boss suction may be introduced through the perforations into the grooves above described from any desired evacuating means.

The ridges 12 which separate the grooves 11 substantially conform in size and shape to the standard sizes of film and paper, as 4" by 5", 5" by 7", 8" by 10", etc. The face of plate 13 may suitably be marked for these various sizes of film to correspond to the positions of the appropriate ridges. Suitable provision is made to provide suction over the area of the plate 13 covered by the sheet material to be held in place.

To adjust the support for use with a desired size of film, a valve 17 is slidably mounted in a slideway 18, formed between two flanges 19 disposed on the rear face of the plate, as shown in Figs. 2 and 3. The slideway registers with perforations 14 and serves as a duct for communicating the desired perforations with the source of suction by the adjustment of valve 17.

This valve 17 is shown as an elongated member formed with a longitudinal chamber 20, of a length sufficient to encompass all but one of perforations 14, and an adjacent terminal chamber 22 separated from chamber 20 by a partition 24 encompassing the outermost perforation. A small perforation 26, piercing partition 24 provides restricted communication between the two chambers. As clearly shown in Fig. 4 of the drawing, chamber 20 of valve 17 communicates with the innermost perforation, which in turn communicates through cross groove 16, Fig. 1, with the source of suction. Thus chamber 20 receives the full degree of suction as soon as the suction is applied. However, chamber 22 communicating with chamber 20 through the small perforation 26 receives only a slight degree of suction at first, and comes up only gradually to the full degree of evacuation of chamber 20.

For adjusting the valve 17 so as to encompass the required number of perforations 14, corresponding to the width of sheet or film to be supported, a finger piece 28 is attached in any suitable manner to the back surface of the valve member. Finger piece 28 is preferably formed of sheet spring metal comprising a body portion 30 and a tab portion 32 stamped out from one end of the body portion, forming two spring prongs 34 at said end. A cover plate 40 formed with a slot 42 is attached to the back of plate 10 to lie flat against flanges 19 and engage the body portion 30 of finger piece 28, so as to yieldably hold the valve member in sliding air-tight engagement with plate 10 about the desired perforations 14. Slot 42 is disposed so as to register with tab 32 and is of a length sufficient to permit movement of the tab for adjusting the valve 17 to encompass the required number of perforations 14, corresponding to the sizes of sheet or film to be held. Body member 30 and prongs 34 may be given a suitable initial bend or bias so that they may serve as a spring member yieldingly pressing valve member 17 into air-tight engagement against the back of plate 10. A scale 44 with suitable indicia may be provided on plate 40 adjacent to slot 42 to indicate the position of tab 32 corresponding to the desired adjustment for different sizes of sheet or film.

From the above description the operation of the improved vacuum sheet or film support will be clear. Before or after the sheet or film is inserted in place the valve 17 is adjusted by sliding the tab 32 to the desired position as indicated by scale 44. The suction is then turned on, evacuating chamber 20, so as to cause the body of the sheet or film to lie perfectly flat against perforated plate or grid 13. However, at the edges of the sheet or film lying in registration with the perforation or duct 14 communicating with chamber 22 of valve 17, the degree of suction is only slight at first, thus prevent-

ing the edges of the sheet or film from hugging plate 13 until the body of the sheet or film is perfectly flat and smooth.

Consequently, any tendency of the sheet to wrinkle due to initial adherence of the edges of the sheet is avoided, irrespective of the size of the sheet being held.

The face plate 13 is preferably formed of thin, plastic material, such as Bakelite, hard rubber, Lucite, polyvinyl plastic or the like and is black in color. To secure a smooth, even plate surface on the film, paper or other sheet material, it is necessary that the thickness of the material, as well as the size and spacing of the holes be carefully controlled.

Thus, it has been found that the thickness of the face plate should be at least about $\frac{1}{32}$ of an inch to avoid rippling or waviness due to the pull of the suction on the plate. Its thickness may be as much as $\frac{1}{16}$ or $\frac{1}{8}$ of an inch, thicker material being unnecessary and undesirable. To secure even and uniform distribution of the suction on the sheet material, it has been found that the perforations should be from about $\frac{1}{32}$ to about $\frac{1}{64}$ of an inch in diameter and should be spaced from about $\frac{1}{8}$ of an inch to about $\frac{1}{4}$ of an inch between centers. The perforations are uniform and continuous over the entire surface of plate 13 and consequently the plate may be inexpensively made from a uniformly punched plastic sheet. By use of such a face plate on a multi-channel vacuum back as herein described, it becomes possible to use a relatively thin plate uniformly perforated over its entire surface, which may be economically produced, as by a punching operation. In use of such a plate the sheet material is held in place without buckling or rippling and a substantially true plane optical surface is secured.

The above detailed description is illustrative of the invention but not limited to the exact details thereof. Many variations will occur to those skilled in the art without departing from the spirit and scope of the invention as defined in the accompanying claims.

What is claimed is:

1. A vacuum support for a photosensitive sheet or film, comprising a backing plate provided with concentric grooves on the front face thereof, a continuously foraminated, thin, plastic sheet attached to said face adapted to receive a sheet or film to lie flat thereagainst, there being a series of perforations passing through said grooves to the rear of said backing plate, and a valve disposed on the rear of said backing plate, said valve being connected to a source of vacuum and adapted to be connected to a selected number of said perforations, guide flanges formed on the rear of said plate, said guide flanges extending along straight lines and encompassing said perforations, said valve slidably mounted between said guide flanges, a cover plate over said guide flanges and valve to retain said valve in its guideway, a slot formed in said cover plate over said guideway, and a finger piece projecting from the valve through said slot, whereby said valve may be adjusted to connect a selected number of said grooves to said source of vacuum.

2. A vacuum support for a sheet or film, as defined in claim 1, wherein said valve is formed with a chamber adapted to encompass a selected number of perforations of a series starting with the innermost perforation, and another chamber formed in said valve adapted to encompass a perforation exterior to said selected perforations, a partition in said valve separating the two chambers and a small orifice in said partition for restricted communication between said chambers.

3. A vacuum support for a sheet or film as defined in claim 1, wherein means is provided between said cover plate and valve for holding said valve in air tight relation to said backing plate.

4. A vacuum support for a sheet or film as defined in claim 1, wherein said finger piece is formed of a spring strip, said strip having an integral tab struck out from

one end thereof for passing through said slot, the other end of said strip being biased to yieldingly contact said valve and the adjacent inner surface of said cover plate so as to yieldingly urge the valve into air-tight engagement with the backing plate.

5. In combination with a vacuum support for a photosensitive sheet or film, comprising a backing plate provided with concentric grooves on the front face thereof, a continuously foraminated plate attached to said face adapted to receive a sheet or film to lie flat thereagainst, there being a series of perforations passing through said grooves to the rear of said backing plate, means in association with said backing plate adapted to be connected to a source of vacuum, and a valve disposed on the rear of said backing plate and connected to a source of vacuum, said valve being adapted to be connected to a selected number of said perforations, said valve having means incorporated therewith, and effective when said valve is connected to a selected number of said perforations including the perforation passing through the groove registering with the marginal portion of the sheet or film, for delaying the introduction of vacuum to the groove registering with the marginal portion of the sheet or film to prevent adherence of the marginal portion until the body of the sheet or film is flat and smooth against the foraminous plate, means for guiding said valve in a path to register with a selected number of said perforations, said valve being provided with a chamber to communicate with a desired selected number of perforations leading to a corresponding number of inner grooves, and a separate chamber for registering with an outer groove adjacent to said selected inner grooves, and means for delaying the introduction of vacuum to said separate chamber.

6. A vacuum support for a photosensitive sheet or film, comprising a backing plate provided with concentric grooves on the front face thereof, a continuously foraminated plate attached to said face adapted to receive a sheet or film to lie flat thereagainst, there being a series of perforations passing through said grooves to the rear of said backing plate, means in association with said backing plate adapted to be connected to a source of vacuum, and a valve disposed on the rear of said backing plate and connected to a source of vacuum, said valve being adapted to being connected to a selected number of said perforations, said valve having means incorporated therewith, and effective when said valve is connected to a selected number of said perforations including the perforation passing through the groove registering with the marginal portion of the sheet or film, for delaying the introduction of vacuum to the groove registering with the marginal portion of the sheet or film to prevent adherence of the marginal portion until the body of the sheet or film is flat and smooth against the foraminous plate, said valve being provided with a chamber to communicate with a desired selected number of perforations leading to a corresponding number of inner grooves, a separate chamber for registering with an outer groove adjacent to said selected inner grooves, and a partition between said chambers, said partition being formed with a small orifice to provide restricted communication between said chambers.

7. A vacuum support for a photosensitive sheet or film, comprising a backing plate provided with concentric grooves on the front face thereof, a continuously foraminated plate attached to said face adapted to receive a sheet or film to lie flat thereagainst, there being a series of perforations passing through said grooves to the rear of said backing plate, means in association with said backing plate adapted to be connected to a source of vacuum, and a valve disposed on the rear of said backing plate and connected to a source of vacuum, said valve being adapted to be connected to a selected number of said perforations, said valve having means incorporated therewith, and effective when said valve is

5

connected to a selected number of said perforations including the perforation passing through the groove registering with the marginal portion of the sheet or film, for delaying the introduction of vacuum to the groove registering with the marginal portion of the sheet or film to prevent adherence of the marginal portion until the body of the sheet or film is flat and smooth against the foraminous plate, said series of perforations being substantially aligned and said valve being mounted to slide along a straight line on the rear of said plate.

5

10

6

References Cited in the file of this patent

UNITED STATES PATENTS

1,288,607	Jobke -----	Dec. 24, 1918
1,945,481	Dilkes -----	Jan. 30, 1934
2,317,348	Wekeman -----	Apr. 17, 1943
2,519,610	Sussin -----	Aug. 22, 1950
2,572,640	Lovegrove -----	Oct. 23, 1951
2,717,756	Keeshan -----	Sept. 13, 1955

FOREIGN PATENTS

79,510	Sweden -----	Feb. 11, 1933
--------	--------------	---------------