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PHOTOPRINTING VACUUM FIXTURE FOR A STRIP OR METAL BAND

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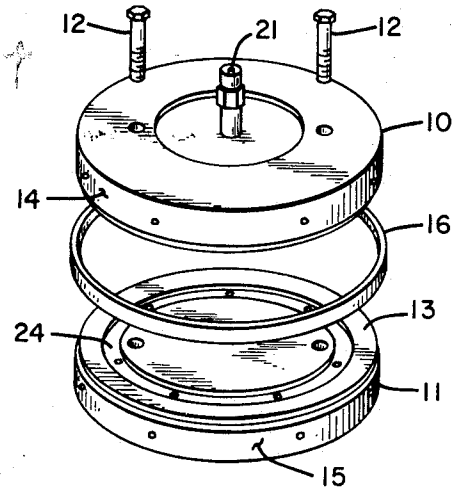


Fig. 1

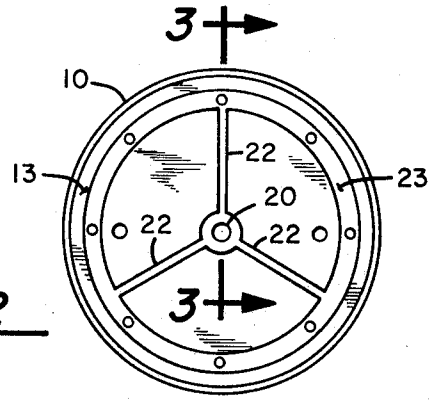


Fig. 2

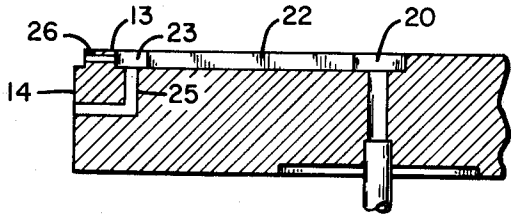


Fig. 3

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PHOTOPRINTING VACUUM FIXTURE FOR A STRIP OR METAL BAND

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ABSTRACT OF THE DISCLOSURE

A wheel-like fixture has a peripheral edge groove for accommodating a strip to be processed. Typically, the strip may be in the form of a metal band which may be made out of aluminum and is coated with a light sensitive enamel. The band is placed in the groove and a strip of photographic film is laid over it. An opening which may be located at the general center of the wheel is in communication with the groove to provide a passageway for a vacuum to draw down on the photographic film to hold it in contact with the enamel coating on the band during photographic processing. The wheel-like fixture may be made up of two separable spaced-apart discs with hubs and for some uses is preferably made out of stainless steel to provide suitable mass which will not warp if subjected to elevated temperatures and temperature differentials. This may occur because in order to seat the band snugly in the groove and to later remove it, it may be necessary to subject the band and the fixture to elevated temperatures to expand the band sufficiently so that it can be slipped into or out of the groove.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to the field of vacuum holding fixtures for use in photographic reproduction processes wherein order to achieve a high degree of definition in the reproduced image it is necessary to make sure that the photographic positive or negative is kept in firm and secure contact with the surface upon which it is to be reproduced. More particularly this invention is concerned with a vacuum holding fixture for use in making photographic reproductions on a strip or ring which may be made out of metal.

Description of the prior art

The prior art contains a number of inventions relating to vacuum holding fixtures for contact photoprinting on flat plates. These fixtures are usually in the form of skeletal supporting frames containing glass having rubber gaskets and various slots and grooves to provide passageways for the applied vacuum to reach the inside of the fixture. These, of course, reveal the general broad teachings of using vacuum techniques for holding a mask or film in contact with a sensitized surface upon which the pattern is to be photographically reproduced. However, none of the prior art fixtures are adaptable for applying this vacuum hold-down technique to a thin strip or a closed ring or the like.

SUMMARY OF THE INVENTION

The wheel-like fixture is provided with a peripheral groove on its edge for receiving a strip or a ring of material in snug seating engagement. An opening is provided into the wheel for receiving a vacuum and passageways are located within the fixture connecting the opening with the peripheral groove whereby the vacuum can be applied to the latter to hold a photographic film in contact with

the exposed surface of the band. When used for photoprinting on a metal band it is essential that the band not be able to slip or slide or otherwise move so it must be held snugly within the groove. This is accomplished by subjecting the band to elevated temperature until it expands sufficiently so it will slip into the groove and then is allowed to cool to contract into snug seating engagement in the groove. Correspondingly, to remove the band it may be necessary to subject the fixture containing the band to the elevated temperature. For this purpose, the fixture is particularly characterized by being made of a material, such as stainless steel and having a sufficient mass so as not to be adversely affected by the elevated temperature or the changes in temperature.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a breakaway view of a preferred embodiment of the invention showing the separated plate members which form the wheel-like fixture and the location of the ring when it is mounted in the fixture for photoprinting;

FIG. 2 is a view of the inner face of the top plate member in FIG. 1; and

FIG. 3 is a sectional view of the plate member illustrated in FIG. 2 as taken along viewing line 3—3 illustrating the path of the passageways between the axial opening and the ridge of the fixture.

DESCRIPTION OF PREFERRED EMBODIMENTS

The fixture is made up of two disc-like plates **10** and **11** having their inner faces facing one another and attached together by bolts **12**. Each of the plates contains on its inner face an annular hub **13**. The radial distance between the outer surface of hub **13** and the outer peripheral edge surfaces **14** and **15** of the respective plate members **10** and **11** defines a groove depth suitable to hold a member, such as ring **16**, for photographic processing.

The upper plate member **10** contains an axial opening **20** passing completely through from outer to inner face. Connected to the outer end of opening **20** is a nipple **21** (FIG. 1) to which suitable tubing can be attached in order to apply a vacuum to the opening. Extending radially outward from opening **20** on the inner face of plate **10** are slots **22** which have their terminal ends at coaxial circular depression or slot **23**. The inner edge of hub **13** defines the outer edge of the circular slot **23**. The other plate **11** does not contain an axial opening or radial slots but does contain a circular slot or depression **24** which is superimposed over the corresponding slot **23** in plate **10** when the two plate members are joined together. In this manner vacuum applied through the opening **20** into the top plate member **10** reaches the bottom plate member **11**. As shown most clearly in FIG. 3, connecting the slot **23** to the outer peripheral edge surface **14** of plate **10** is a passageway **25** which is drilled or otherwise formed in the body of the plate. This provides communication for the vacuum between this outer surface **14** and the input opening **20**. Also extending radially outward from the slot **23** through the hub **13** to its outer surface is a small passageway **26** which provides a path for the vacuum to the groove formed on the edge of the fixture. Although not clearly shown in the drawings, the lower plate member **11** contains identical passageways to similarly provide various paths for the vacuum applied at the opening **20**.

When used in a typical fashion, the plates **10** and **11** are separated and the ring **16** is located between them in the manner illustrated in FIG. 1. The ring **16** may be, for example, an aluminum ring having a coating of light sensitive enamel. The plates are then brought together so that the ring **16** sits snugly in the peripheral groove on the outer surface of the two hubs **13**. Because a snug fit is required, the metal ring **16** usually has to be heated sufficiently so that it will expand enough to slip over the

hubs and yet will cool down to make the snug fit. The plates are then fastened together, with the ring between, by tightening down on the bolts **12**. After the plates have been assembled in this fashion, a strip of photographic film is then laid over the ring and vacuum is applied through the nipple **21** to opening **20**. The vacuum reaches the outer surfaces through the various passageways to pull the photographic film into close contact with the ring so that its pattern, negative or positive, can now be printed onto the band using well-known photoprinting techniques. Preferably the photographic film should be somewhat wider than the ring so that it covers the openings of passageway **25** in the outer edge surfaces **14** and **15** through which the film is held securely in place. The passageways **26** through the hubs **13** also assist in this. After the band has been photographically exposed, it is usually necessary to subject the fixture and band assembly to an elevated temperature long enough for the metal band to expand sufficiently to be slipped off the hub surfaces. The band is then processed further to develop out the photoprinted matter and for whatever else needs be done.

When used in the manner described above it becomes apparent that the fixture must be made of a material which will remain stable even though subjected to elevated temperatures and temperature differentials. So for this purpose the fixture plates should be made of a mass of metal, such as steel, which will withstand the elevated temperatures and the temperature differentials without warping. It is contemplated, however, that the invention can be used and the attendant features and advantages be realized using other than rigid metal bands. For example, it could be used on an elongated strip of relatively flexible material which may be placed around in the peripheral groove after being formed into a closed loop ring or it could be merely a strip which closes on itself. For uses such as that, it is clear that the fixture would not require such a mass and weight as that which is required when it is subjected to temperature differentials. Similarly, for the latter type of use it would not be essential for the fixture plates to be separable during use, although separate plate members would facilitate machining of the inner parts of the fixture to make the slots and various other vacuum passageways.

We claim:

1. A vacuum fixture for use in photoprinting on bands or rings and the like, comprising:

(a) a rigid wheel having front and back faces;

(b) a circumambient groove around the ridge of said wheel between said faces;

(c) an opening into one of the faces of the wheel; and

(d) a plurality of passageways within said wheel for communicating between said opening and said groove.

2. The invention as in claim **1** wherein said wheel comprises a pair of parallel, spaced-apart, separable front and back plate members having coaxial hubs arranged face to face.

3. The invention as described in claim **1** wherein said opening into the face of the wheel is an axial opening and said passageways extend substantially radially outward from said opening to said groove.

4. The invention as described in claim **3** wherein said passageways are arranged to enter said groove at spaced intervals along the groove.

5. The invention as described in claim **4** further including passageways within said wheel communicating between said opening and the circular edge surface of said plate member wheel.

6. The invention as described in claim **2** wherein:

(a) one of said plate members contains,

(1) an axial opening passing through its face,

(2) a circular slot on its inner face concentric with said opening,

(3) radially extending slots on said inner face communicating between said circular slot and said opening,

(4) passageways communicating between said circular slot and the outer peripheral surface of said plate, and

(5) passageways communicating between said circular slot and the outer surface of the hub; and

(b) the other plate member contains,

(1) a circular slot on its inner face superimposing the circular slot in said one plate member,

(2) passageways communicating between said latter circular slot and the outer peripheral surface of said other plate member, and

(3) passageways communicating between said latter circular slot and the outer surface of the hub.

7. The invention as described in claim **6** wherein the plate members are characterized by their shoulders defining a groove dimensioned to receive a band in snug seating engagement in the groove and their remaining peripheral surface accommodating a photographic film strip overlaying said band.

8. The invention as described in claim **7** wherein the passageways communicating between the opening in said one plate member and the peripheral surface of the hub are arranged to provide a vacuum path for holding the film in contact with the band.

9. The invention as described in claim **8** wherein said plate members are characterized by being constructed out of stainless steel with a mass sufficient to retain dimension when subjected to prescribed elevated temperature for a limited period of time.

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