Sept. 19, 1939. L. HUGHES 2,173,168

VACUUM FRAME

Filed June 4, 1936

Fig. 1.

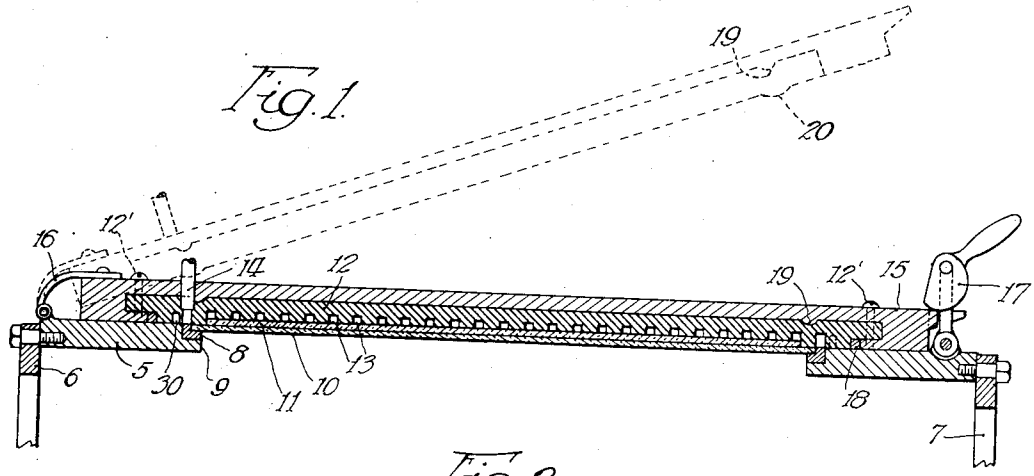


Fig. 2.

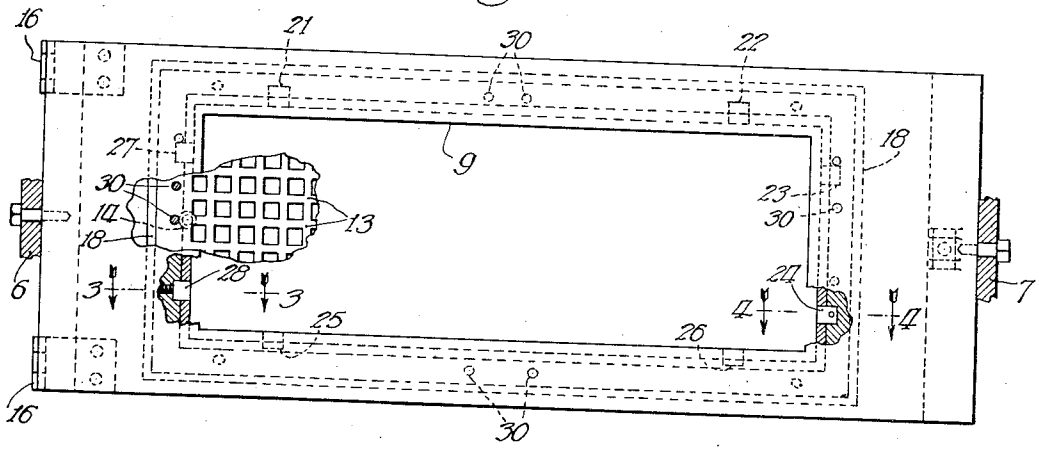


Fig. 3.

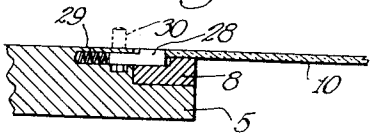


Fig. 4.

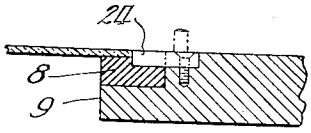
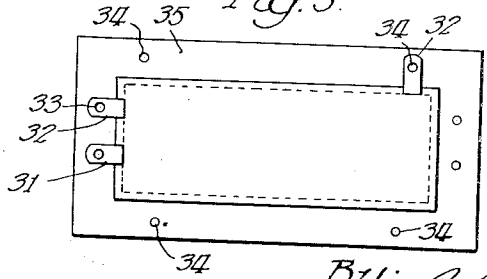


Fig. 5.



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Patented Sept. 19, 1939 2,173,168

UNITED STATES PATENT OFFICE

2,173,168

VACUUM FRAME

Leonard Hughes, Chicago, Ill.

Application June 4, 1936, Serial No. 83,535

8 Claims. (Cl. 95—76)

My invention relates to improvements in the art of photogravure, rotogravure, and the like.

More specifically, it relates to an improvement in the method of reproducing for printing by the above process images of any desired materal objects such as typed matter, photo drawings, and natural objects.

It is one of the objects of my invention to so improve the method of photographing and the various steps of handling the images used in the art of photogravure that the time necessary for this reproduction may be materially reduced.

It is also an object of my inventon to provide an improved method for photographic vacuum printing of the negatives, positives, and carbon tissue used in the art of photogravure whereby a uniform and highly preferred print may be produced without failures, this print being free from the Newton rings and other patterns produced by the use of the present vacuum printing frame.

The present invention contemplates the provision of means for transferring a photo image throughout the photogravure or rotogravure process in such a manner that the photo image is fitted to a predetermined register contained in the various holders, frames, and carbon tissue transfer mechanism and is independent of any manually placed register. It is carried throughout the process as a unit of register which unit when joined by other units of a like character will complete a predetermined cylinder with all of the parts automatically in register.

Other and more specific objects and advantages of the invention will appear as the description progresses, reference being had to the accompanying drawing. It is to be understood, however, that the drawing and description are illustrative only and are not to be taken as limiting the invention except in so far as it is limited by the claims.

In the drawing—

Fig. 1 is a view in longitudinal section of my improved vacuum printing frame;

Fig. 2 is a bottom plan view of the frame, certain parts being broken away to illustrate the interior construction;

Fig. 3 is an enlarged sectional view on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged sectional view on the line 4—4 of Fig. 2; and

Fig. 5 is a fragmentary view of a registering means showing how it attaches to a negative, positive, carbon tissue, or other sheet used in the process.

Referring now in detail to the drawing, it is essential first to describe the purpose for the particular structure shown in order that its function may be more readily understandable.

One of the greater difficulties in the art of photogravure lies in the imperfections which so readily appear when glass or polished surfaces are placed together during the carrying out of the process. Dust which gets between the tissue and positives when printing also produces defects, and, in fact, any dirt or foreign matter which gets to the carbon tissue and affects the exposure of the carbon tissue is reflected in the final work.

Furthermore, a further great problem in the art to which the present invention pertains is that of obtaining register or position of the photo image whereby a single unit of register can be used throughout the process or an addition or a division of a unit of register can be made at the various steps of the process of purely a mechanical character. Heretofore, in the process as I have known it, the methods of register employed do not avoid the making of prints which are out of register. When such a defect is discovered, the present system does not provide means whereby it can be determined at what step of the process the defect occurred. The present invention contemplates the avoidance of the above difficulties by the use of the materials shown in the accompanying drawing.

In Figs. 1 and 2, a frame 5 is shown as pivoted upon supports 6 and 7 in order that it may be adjusted into a horizontal or vertical position. This frame 5 has a rubber cushion seat 8 around an aperture 9 therein which seat is adapted to receive a glass positive or negative plate 10 carrying the image which is to be transferred to a sheet 11 such as carbon tissue. The sheet 11 is forced into intimate contact with the plate 10 by a vacuum blanket 12 having a multiplicity of grooves indicated at 13 therein by means of which air may be drawn off through an outlet 14 as will be readily understood. The vacuum blanket 12 is carried by a hinged support 15 that is hinged at 16 and may be locked in place by a handle 17 as will be readily understood. The vacuum blanket has an outer ring 18 of relatively soft rubber adapted to seal against the frame 5. The blanket is secured in the support 15 by any suitable means such as shown at 12'.

In order to obtain pressure to initially force the plate 10 against its rubber seat 8 sufficiently to permit drawing a vacuum, the blanket 12 is caused to bulge opposite the edge of the plate 10 by furnishing a rib 19 in the support 15 which rib extends circumferentially around the blanket

12, and, when the blanket is free of pressure, causes the blanket to bulge out as indicated at 20 in Fig. 1. It will be readily understood that, when the hinged support 15 is lowered upon the frame 5, this bulged rim 20 will press the plate 10 against its rubber seat 8 with sufficient force to create an air tight connection.

The frame 5 has thereon a series of registry blocks at 21, 22, 23, and 24 which are fixed points of register. That is, they are immovably fixed to the frame 5 and accurately positioned so that a sheet contacting therewith will be properly positioned in the frame. Opposite the fixed points of register 21, 22, 23, and 24 are movable blocks 25, 26, 27, and 28. These blocks are mounted in the frame 5 and spring pressed by suitable springs 29 so as to urge a sheet or plate against which they fit toward the fixed points of register.

In addition to the above features, the frame 5 is desirably provided with a multiplicity of registry pins 30 which are spaced as indicated in Fig. 2 in such a fashion around the periphery of the aperture 9 as to give a means whereby smaller sheets than the sheet 11 can be positioned and registered within the frame 5. As an example of the use to which such devices are put, Fig. 5 illustrates a frame 35 on which there are mounted a series of register lugs comprising thin metal strips 31 and 32 which strips are provided with apertures at 33 to receive registry pins such as the pins 30 or pins 34 of the said frame 35.

In the provision of a continuous set register throughout the photogravure process for a unit of any given size, it is necessary to have a dark slide of a camera which is of a proper size and which is registered in a definite position in the camera by registering means corresponding to the registering means provided herein. Two printing frames are provided like the present frame. One of these frames is a frame in which the positive is printed from the negative in a dark room. The other is a frame in a room of subdued daylight where the positive is printed onto carbon tissue. Both of these frames are alike and like the frame shown in the present application.

In the final transfer to the cylinder which is to be etched and from which the copies are made, the carbon tissue is registered with respect to the cylinder by means of a bar at the cylinder to which register openings such as the openings 33 are attached by means of pins provided on the bar. In the present state of the art, zinc plates are used for backing up the gelatin of the carbon tissue. It is more desirable, however, to attach the registering lugs or strips 31 and 32 to the back of the carbon tissue while the carbon tissue is in the frame 5 utilizing register pins 30 for this purpose. The only requirement of the strips such as 31 and 32 is that they be made of a material which is sufficiently rigid to position the sheet to which they are attached. This attaching may be readily done by applying adhesive to the ends of the strips 31 and 32. The strips 31 and 32 can be placed on the desired pins 30 and over the back of the carbon tissue and then secured against the carbon tissue by the vacuum blanket when the vacuum pressure is applied. This insures correct register. The length of the strips 31 and 32 is made to fit the particular positioning or registering purpose. That is, if a small photo image is to be located in spaced relation to a side wall or end wall of a frame, a strip long enough to give the proper space will be attached to the photo image.

For assembling a group of individual sheets in a frame so as to produce a larger unit of register, each individual photo image will be placed in a frame or registering device like that shown in Fig. 5, and the strips will be attached to each photo image in proper position to determine the final position of the photo image in the larger unit on the frame 5. A plurality of pins 34 are provided around the frame 35 that is used for this purpose.

The use of the frame is believed to be evident from the drawing. The register strips or lugs 32 can be attached at one end and at one side of the photo image. The position of the small photo image in the frame 5 will be determined by the position of the strips thereon. The pins 30 on one side of the frame 5 may be spaced farther apart than the pins 30 on the other side. Then the pins 34 at the sides of the frame 35 will be correspondingly spaced from the corners thereof.

The dark slide of the camera should have register lugs fitted in exact relation to the other register points to be used in the frame 35 and frame 5 and on the cylinder register device. In this way, means are provided for the continuous use of a set register throughout the photogravure process. It is to be understood that the material or copy to be photographed is in all cases placed in a correct position before the camera so that an act of registry is also made at this step. This is true whether a single unit or a multiple unit of photo images is used.

If the register is for a single large size to fit the frame 5, it is not necessary to assemble a plurality of individual photo images. In the case of a number of photo images, my invention provides means for attachment of register strips to a group of individual photo images whereby they are placed together and a larger unit of register is employed by the collective group, utilizing the register strips.

This application is a continuation in part of my application Serial No. 17,387, filed April 20, 1935, for improvements in the Art of photogravure. It contains some of the subject matter divided out of that application, and new matter has been added to that disclosure.

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

1. A vacuum frame device for use in photogravure and like processes having a frame provided with a rectangular seat for a rectangular plate carrying a photo image, said frame having registry stops at two adjacent side edges of said seat and means for holding plates seated therein against said registry stops, a vacuum blanket having a recess therein for a receiving sheet, said blanket having a rim portion overlapping said stops and overlapping the junction between the plate and the frame and sealed to both.

2. A vacuum frame device for use in photogravure and like processes having a frame provided with a rectangular seat for a rectangular plate carrying a photo image, said frame having registry stops at two adjacent side edges of said seat and means for holding plates seated therein against said registry stops, a vacuum blanket having a recess therein for a receiving sheet, said blanket having a rim portion overlapping the junction between the plate and the frame and sealed to both, said frame and blanket having pin and socket means for locating the blanket on

the frame, and register strips adapted to be pressed against said sheet by the pressure of said blanket and held in place by said locating means.

3. A vacuum frame device for use in photogravure and like processes having a frame provided with a rectangular seat for a rectangular plate carrying a photo image, said frame having registry stops at two adjacent side edges of said seat and means for holding plates seated therein against said registry stops, a vacuum blanket having a recess therein for a receiving sheet, said blanket having a rim portion overlapping the junction between the plate and the frame and sealed to both, register strips for engaging said sheet and attachable thereto by being pressed against the sheet by the pressure between the blanket and the plate, and register strip receiving members fixed on the frame at spaced points around the rectangular seat.

4. A vacuum frame device for use in photogravure and like processes having a frame provided with a rectangular seat for a rectangular plate carrying a photo image, said frame having registry stops at two adjacent side edges of said seat and means for holding plates seated therein against said registry stops, a vacuum blanket having a recess therein for a receiving sheet, said blanket having a rim portion overlapping the junction between the plate and the frame and sealed to both, register strips for engaging said sheet and attachable thereto by being pressed against the sheet by the pressure between the blanket and the plate, and register strip receiving members fixed on the frame at spaced points around the rectangular seat, said members being within the area covered by said blanket.

5. A vacuum frame of the character described, having a frame provided with a seat for a plate having the transferable picture or design thereon, a vacuum blanket adapted to press a sheet against said plate, registering pins on said frame and register strips connected to said pins and overlapping the sheet between the blanket and plate and means fixing the strips to the sheet when they are pressed together by said blanket.

6. A vacuum printing frame comprising a rectangular frame having a rubber cushion seat formed therein for receiving the periphery of a plate having the transferable picture or design thereon, and a vacuum blanket having a peripheral rim engaging the surface of said frame around the seat to form a seal therewith, said blanket being recessed to receive a receiving sheet.

7. A vacuum printing frame comprising a rectangular frame having a rubber cushion seat formed therein for receiving the periphery of a plate having the transferable picture or design thereon, and a vacuum blanket having a peripheral rim engaging the surface of said frame around the seat to form a seal therewith, said blanket being recessed to receive a receiving sheet, said blanket having a raised portion thereon substantially opposite the seat in said frame for engaging the side of the plate opposite the seat to cause the plate to seal in its seat.

8. A vacuum printing frame comprising a frame having a cushion seat formed therein for receiving the peripheral edge of a plate having the transferable picture or design thereon, and a vacuum blanket having a peripheral rim engaging the surface of said frame around the seat to form a seal therewith, said blanket being recessed to receive a receiving sheet, said blanket having a raised portion thereon for engaging the side of the plate opposite the seat, and said frame having registering stops therein forming part of the rim of said seat.

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