July 20, 1948. W. L. DE LANO 2,445,566

PNEUMATICALLY OPERATED CONTACT PRINTER

Filed Nov. 29, 1945 4 Sheets-Sheet 1

Fig. 1.

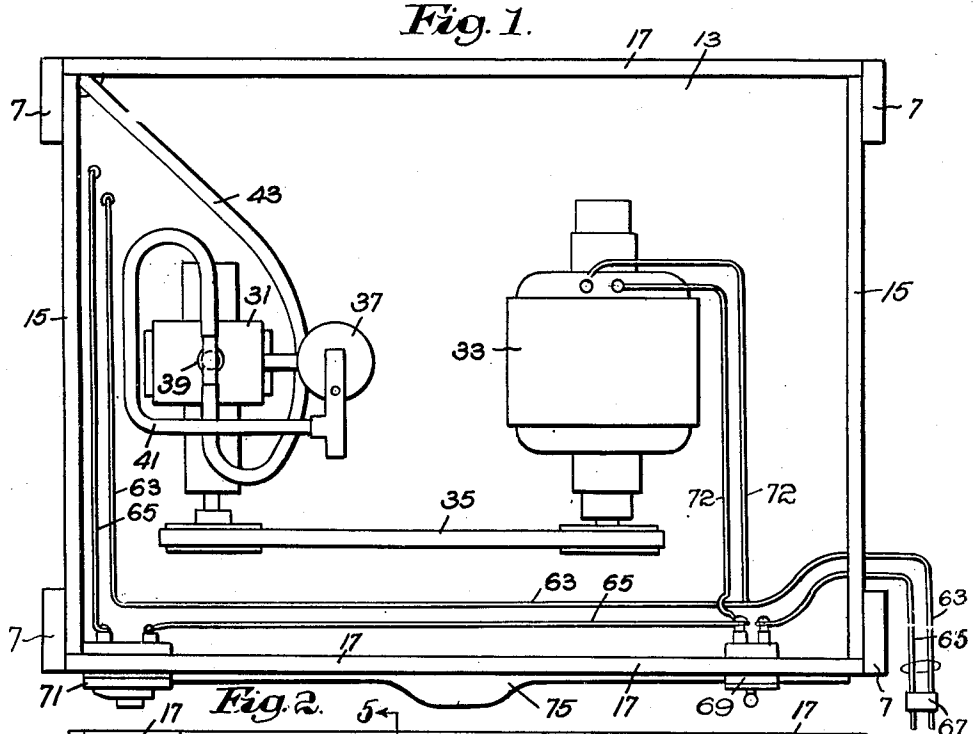
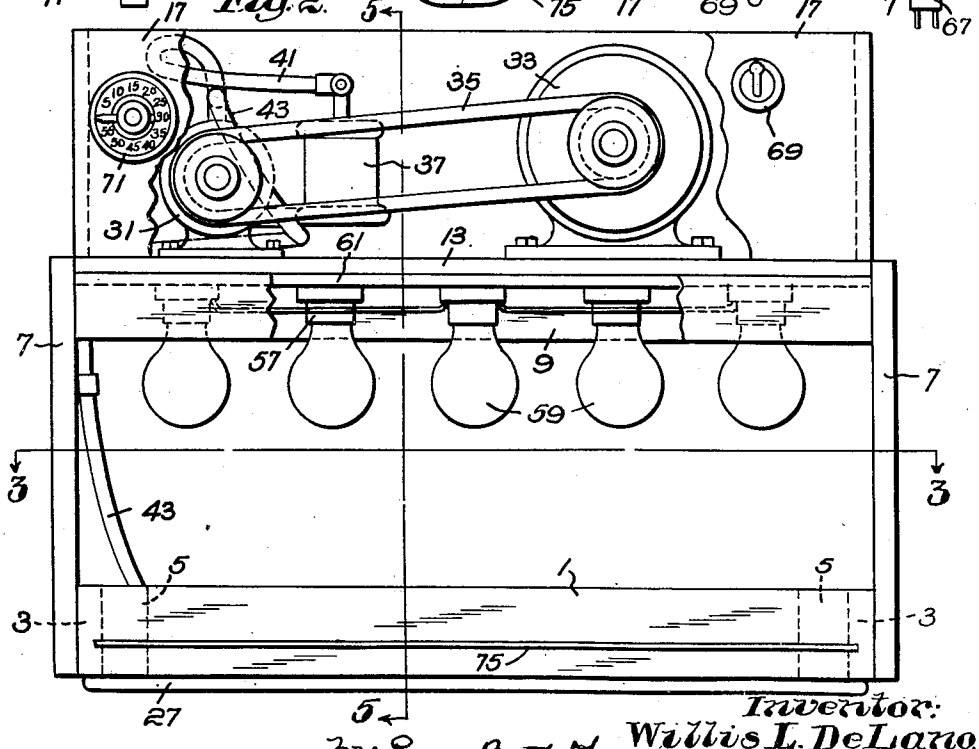


Fig. 2.



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Fig. 3

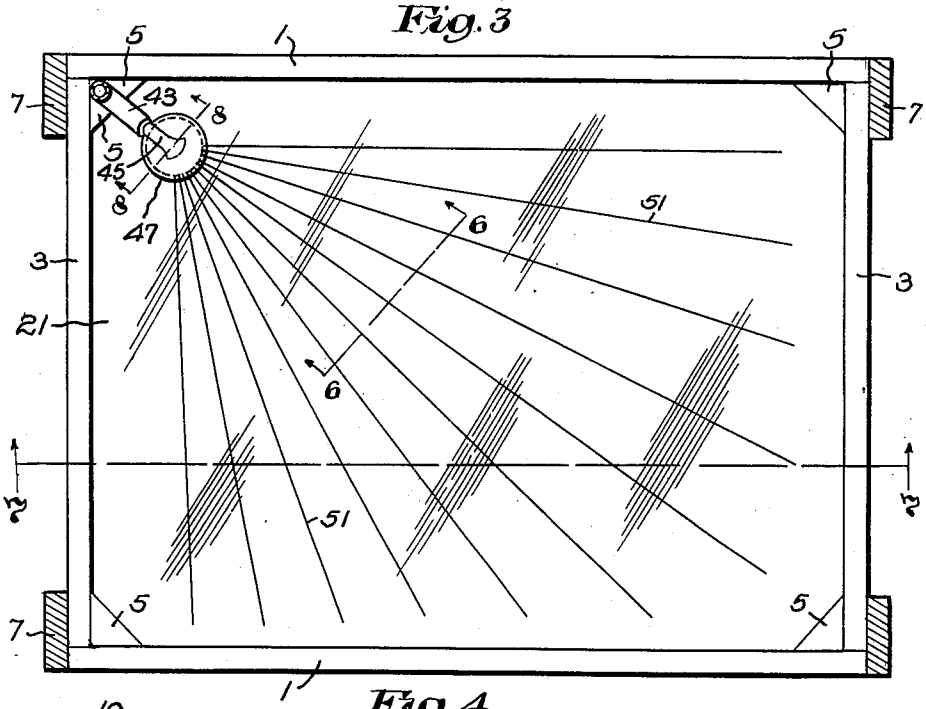
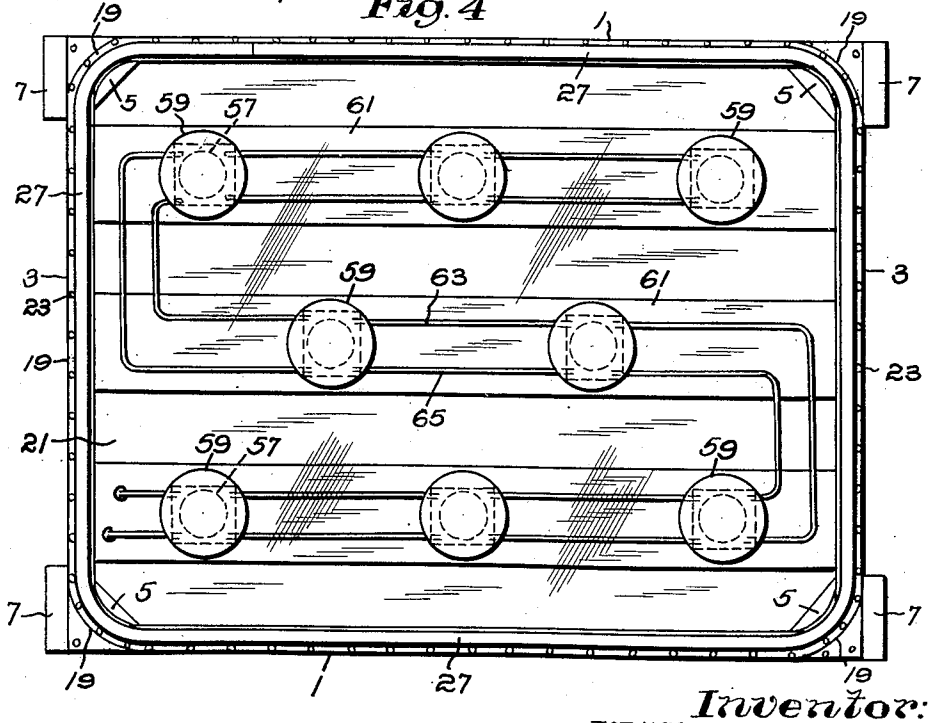


Fig. 4



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Fig. 5.

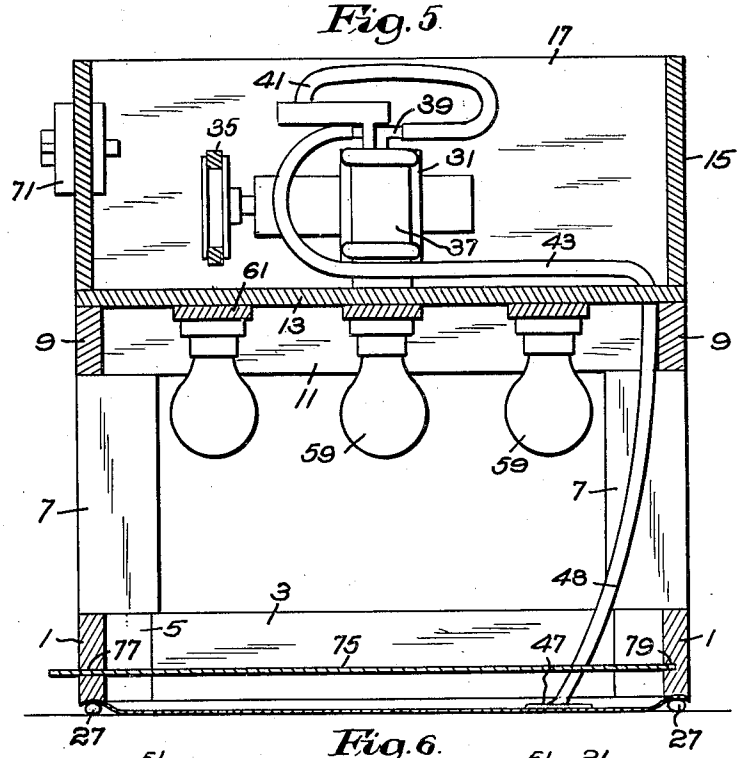


Fig. 6.

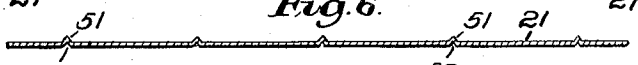


Fig. 7.

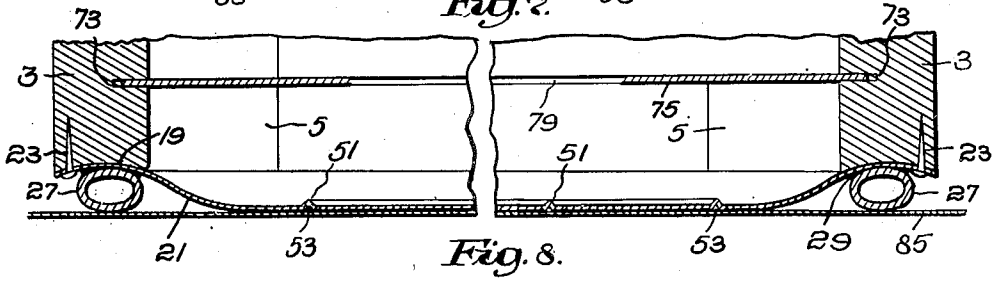
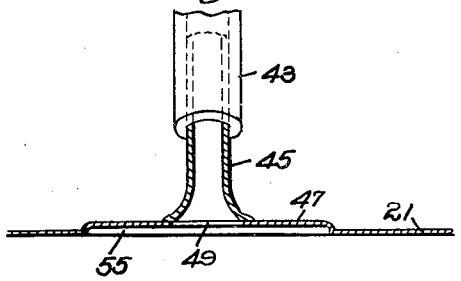


Fig. 8.

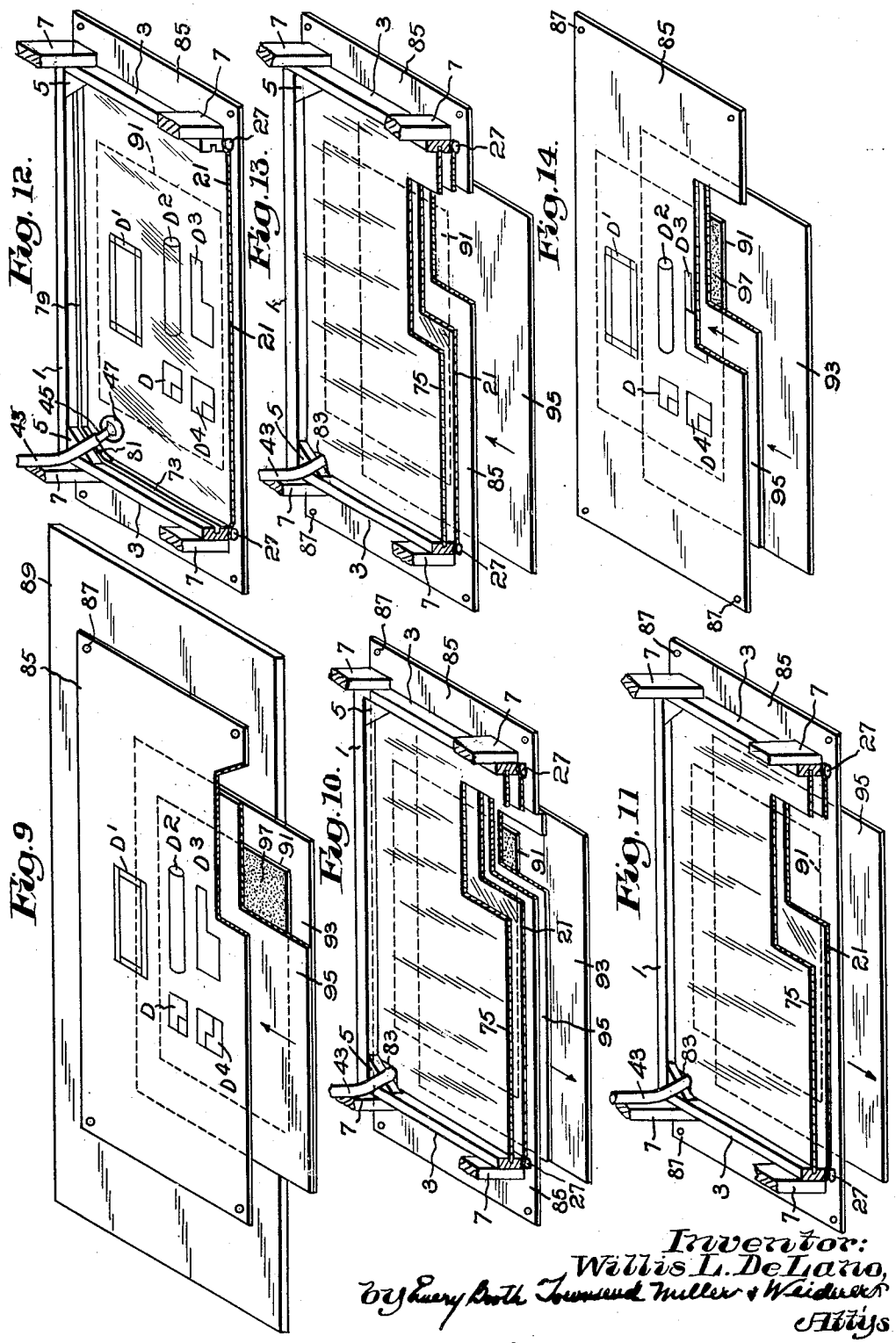


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PNEUMATICALLY OPERATED CONTACT PRINTER

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UNITED STATES PATENT OFFICE

2,445,566

PNEUMATICALLY OPERATED CONTACT PRINTER

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Application November 29, 1945, Serial No. 631,557

3 Claims. (Cl. 95—76)

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My invention relates to apparatus for making photographic so-called "contact prints" of drawings and the like.

It frequently is desirable to make prints of drawings or parts thereof while the paper or the like on which the drawing is made is still on the drawing-board, which latter commonly is a fixed part of a draftsman's table. Heretofore no wholly satisfactory apparatus for making prints under such circumstances has been proposed. The present invention however has proved wholly satisfactory for such use, and in respect to that use achieves the results sought in a practical and simple way without complexity of mechanism and at a minimum cost in respect to operation and capital investment.

The invention, which however may be employed for uses other than that above mentioned, will be best understood from the following description when read in the light of the accompanying drawings, while the scope of the invention will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a plan of apparatus according to the invention;

Fig. 2 is an elevation of the apparatus according to Fig. 1, with parts broken away;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a bottom view of the apparatus according to Figs. 1, 2 and 3;

Fig. 5 is a section on the line 5—5 of Fig. 2;

Figs. 6, 7 and 8 are fragmentary sections on the lines 6—6, 7—7 and 8—8, respectively, of Fig. 3 on an enlarged scale; and

Figs. 9 to 14 are perspective views diagrammatically illustrating one way of using the apparatus according to Figs. 1 to 8 in the practice of the method according to the invention.

Referring to the drawings, which show the embodiment of apparatus according to the invention selected for illustrative purposes, a frame, preferably of wood, is provided, this frame having a lower edge portion formed by the pairs of parallel elongated strips 1 and 3 which are arranged to form an interior rectangular opening surrounded by continuous walls constituted by the strips. As shown, the joints between the strips 1 and 3 at the four corners of the rectangle formed by them are interiorly braced by the triangular-shaped blocks 5, the bottom surfaces of these blocks being in the same plane as the lower edges of the strips 1 and 3. At each of the four corners of the rectangle at the exterior of the strips 1 and 3 is a vertically extending post 7. These posts at their upper ends are connected by

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strips 9 and 11 parallel to the strips 1 and 3, respectively. Supported on the strips 9 and 11 at its four edge portions is a platform 13, and surrounding the space above the platform is an open top casing formed by the longitudinally extending parts 15 and 17. The parts constituting the frame or support just described may be secured in assembled relation in any convenient way as, for example, by screws (not shown), as will be obvious to those skilled in the art.

As illustrated, the lower edges of the strips 1 and 3 are transversely concaved as illustrated at 19 (Fig. 7). Received in the concaved grooves thus formed, which grooves extend across the blocks 5, are the edge portions of a sheet or blanket 21 formed of transparent flexible material such as material commonly employed for photographic films, or other transparent flexible material made of suitable so-called "plastic." This sheet extends entirely across the opening formed by the rectangular arrangement of the strips 1 and 3 so as to close that opening. As illustrated, the edge portions of the sheet or blanket 21 may be secured in the grooves formed by the concavities 19 by cement (not shown), and may be additionally secured therein by tacks or the like 23.

As hereinafter more fully described, the transparent flexible sheet or blanket 21 is adapted to rest on the upper surface of the material on which a drawing is formed, for example a sheet of drawing paper shown at 85 in Figs. 7 and 9 to 14, while said sheet is on the drawing-board or draftsman's table and is therefore rigidly supported. For sealing the joint between the sheet or blanket 21 and the surface on which it rests there is preferably associated with said sheet a gasket which, as herein illustrated, is in the form of a rubber tube 27 extending continuously about the edge portions of the sheet at its under side. This tube, as shown, is continuously secured to the under side of the sheet or blanket by cement, as indicated at 29. When the frame is placed on the surface having the drawing its weight is supported by the gasket, which being of yielding flexible material is pressed into continuous contact with said surface and in that way seals the joint between said surface and the edge portions of the sheet.

As illustrated, the platform 13 carries at its upper side a vacuum pump 31 driven by an electric motor 33 to which it is connected by a driven belt 35. This vacuum pump may be of any suitable sort, and is preferably of the rotary displacement type, being provided with a vacuum relief valve 37, of known construction, connected

to the suction inlet **39** of the pump by a rubber hose or other conduit **41**, the construction being such that when the pump is not in operation the valve in a known way connects the suction inlet to the atmosphere so as to break the vacuum established by the pump when in operation. As shown, the suction inlet of the pump is also connected by a hose or the like **43** to a nipple **45** integral with the upper side of the sheet or blanket **21** at one corner thereof. Preferably this sheet is struck up by an embossing operation to form it with a slightly raised boss-like portion **47** at the central portion of which is formed an orifice **49** in fluid communication with the nipple **45**. As a result when the pump **31** is driven by the motor **33** the air between the transparent sheet or blanket **21** and the surface on which the gasket **27** rests will be exhausted to cause said sheet to be pressed firmly against said surface, and, when the operation of the motor is discontinued, the vacuum relief valve will cause such space to be connected to the atmosphere and the pressure of the sheet against said surface therefore to be relieved. For facilitating withdrawal of the film of air beneath the sheet or blanket over its entire extent the sheet, as illustrated, is struck up to form a plurality of radiating V-shaped ridges **51** which on the under sides of the sheet form groove-like channels **53** (Fig. 6) communicating with the recess **55** beneath the slightly raised boss-like portion **47** of the sheet.

At its under side the platform **13** is shown as carrying a plurality of spaced lamp sockets **57** for lamps **59**, the sockets being mounted on strips **61** secured in any suitable manner to the under side of the platform. The lamps of the bank of lamps thus formed are shown as connected in parallel by the leads **63** and **65** to the "plug" **67** (Fig. 1), the plug being adapted to be inserted in a socket outlet of a house or building lighting system. Interposed in the lead **65** in series with each other is shown a toggle switch **69** and a manually set, variable, time controlled switch **71**, both carried by one of the parts **17** of the casing at the top of the platform **13**. As shown (Fig. 1), the terminals of the motor **33** are connected across the leads **63** and **65** by leads **72** (Fig. 1) at such point as to place the motor under the control of the toggle switch **69**.

The bank of lamps constitutes light emitting means above the transparent flexible sheet or blanket **21** for exposing said sheet to light for a period controlled by the time controlled switch **71**, which latter may be of a known construction in which it may be set manually by the operator to remain in closed circuit condition for variable definite lengths of time selected by him.

As shown, the frame strips **3** above the transparent sheet or blanket **21** are provided on their inner sides with longitudinally extending grooves **73** (Figs. 7 and 12) for receiving an opaque sheet **75**, the purpose of which latter when inserted is to mask the transparent sheet from the light emitted from the bank of lamps **59**. One of the frame strips **1** is shown as provided with a slot **77** (Fig. 5) through which the sheet **75** may be slid for removable reception of its edge portions in the grooves **73**, the opposite strip **1** having a groove **79** for receiving the extreme end of the sheet. As best shown in Fig. 12, the blocks **5** are provided with grooves **81** placing the rearward ends of the grooves **73** in communication with the ends of the groove **79**, the corners of the sheet **75** being cut off to conform to the bottoms of the grooves **81** when inserted therein. For clearing the hose **43** the sheet **75** at one corner is notched as indicated at **83** in Fig. 13.

A way of using the apparatus above described is diagrammatically illustrated by Figs. 9 to 14. In these figures a sheet **85** of ordinary drawing paper, or other material of such nature as will transmit sufficient light or actinic rays for photographically affecting a light sensitized surface, is shown as secured by thumb-tacks **87** to a drawing-board or table top of a draftsman's table **89**, the drawing on such paper being indicated by the lines forming the figures D, D^1, D^2, D^3 and D^4. To make a print of this drawing a sheet **91** of sensitized paper or other suitable material is employed. This sheet may be carried from a dark room, or other place in which it is stored, between a lower opaque sheet **93** (Fig. 9) and an upper opaque sheet **95**, both preferably of fairly stiff, relatively thin material such as opaque "plastic." The sensitized paper and the carrier therefor constituted by the opaque sheets **93** and **95** may be slid under the drawing paper **85** with the sensitized side **97** of the sheet **91** facing the drawing, as indicated in Fig. 9. The support carrying the vacuum pump and transparent flexible blanket **21** may then be placed on the sheet of drawing paper, as indicated in Fig. 10, with the opaque masking sheet **75** in place. The lower opaque sheet **93** of the carrier for the sensitized paper may then be withdrawn, as indicated by the arrow in Fig. 10, and then the opaque sheet **95** of the carrier may be withdrawn, as indicated by Fig. 11, it being immaterial in which order they are withdrawn if the opaque masking sheet **75** is in place. When these operations are completed the parts are in the position indicated by Fig. 12 except that the opaque masking sheet **75** is still in position, that is to say, the sensitized sheet is immediately below the drawing paper with the sensitized side of said sheet in contact with the under side of the drawing paper and the transparent blanket **21** is immediately above the drawing paper in contact with the drawing thereon, while exposure of the sensitized sheet is prevented by the opaque masking sheet **75** and the surrounding walls of the frame. By throwing the toggle switch **69** into closed position when the parts are in the positions just described the motor **33** may be set in operation to drive the vacuum pump **31**, which will exhaust the air from the space immediately below the transparent blanket to cause the same to be pressed firmly over substantially its entire extent against the sheet of drawing paper and the latter to be pressed against the sensitized sheet throughout the entire extent of the latter. After the pump has been in operation for a short period, usually not more than a minute and a half, the time controlled switch **71** may be operated to light the bank of lamps **59** while the operation of the pump is continued, and as soon as the lamps are lighted the masking sheet **75** may be withdrawn to initiate exposure of the sensitized sheet, the parts then being arranged exactly as shown in Fig. 12. As soon as the time controlled switch extinguishes the lamps to terminate the exposure period, which period ordinarily will be but a few seconds, the opaque masking sheet **75** may then be immediately replaced, as indicated in Fig. 13, whereupon the upper opaque sheet **95** of the carrier for the sensitized sheet may be slid into the space between said sensitized sheet and the sheet of drawing paper, as illustrated by the arrow in Fig. 13, and after the sheet **95** is in place the lower opaque sheet **93** of the carrier may be slid into the space between the sensitized sheet and

the surface of the drawing-board or table top, as shown by Fig. 14, it however being immaterial in which order the opaque sheets **93** and **95** are reinserted if the opaque masking sheet **75** is employed. After the carriers is reinserted it may be withdrawn with the sheet of sensitized paper and carried to a dark room for developing the print or negative.

The operations just described form a so-called "night reading" print or negative, and as the sensitized side **97** of the sheet **91** is spaced from the drawing by only the thickness of the drawing paper the print will be clear and sharp.

If it is desired to make a so-called "reverse" print or negative of the drawing while the drawing paper **85** is in its normal position on the drawing-board, the above operations may be performed, except that the sensitized sheet **91** must be so positioned beneath the drawing paper that the sensitized side **97** of said sheet faces away from the drawing, in which case the body of the paper or other material of which the sheet **95** is formed must, like the drawing paper, be capable of transmitting sufficient light or actinic rays for photographically affecting said sensitized side during the exposure period. This way of making a "reverse" negative, however, does not always secure wholly satisfactory results, particularly if the drawing paper is rather thick, it being observed that the light must pass through two sheets of paper and the parting surfaces or joint between them in order to travel from the drawing to the sensitized side of the sheet **91**, with resulting diffusion of the light and consequent lack of sharpness in the negative. Therefore, when a "reverse" negative is desired, in order to insure satisfactory results a socalled "reflex" print or negative is formed. To do this the carrier with the sensitized sheet, instead of being placed under the sheet of drawing paper, is placed above it with the sensitized side **97** of the sheet **91** facing the drawing, after which the frame may be placed over the drawing paper with the transparent blanket in contact with the uppermost opaque sheet of the carrier. The opaque sheets constituting the carrier may then be withdrawn with the masking sheet **75** in place, the vacuum pump put in operation, and the print exposed by lighting the lamps and withdrawing the masking sheet in the same way as before, after which the masking sheet and opaque sheets of the carrier may be reinserted and the exposed print with the carrier be removed for developing the print or negative. It will be understood that in making a reflex print or negative the paper or other material of which the body of the sensitized sheet is formed will be of such nature that it will transmit sufficient light or actinic rays for photographically affecting the senistized side of said sheet, that the drawing paper, like ordinary paper, will be such nature that it will reflect such light or rays, and that ordinarily a longer exposure will be required than when making a right reading print.

If desired, the opaque masking sheet **75** need not be employed. In this case, assuming the carrier is inserted beneath the sheet of drawing paper, as shown in Fig. 9, and the frame is in place, as shown in Fig. 10, the lower opaque sheet **93** of the carrier as soon as it is withdrawn, that is to say, while the upper opaque sheet **95** of the carrier is still in place, may be placed on top of the transparent blanket **21** to protect against exposure the sensitized side **97** of the sheet **91**, whereupon the upper opaque sheet **95** of the carrier may be removed. As soon as the lamps are lighted the lower opaque sheet **93** may be removed from the transparent blanket to expose the sensitized sheet. At the end of the exposure period the upper opaque sheet **95** may be immediately reinserted again to protect the sensitized side **97** of the sheet **91** against further exposure, and then the lower opaque sheet **93** of the carrier may be reinserted so that the sensitized sheet may be carried to the dark room for developing it. In an obvious manner in forming a reflex print the same operations may be performed when the carrier containing the sensitized paper is placed on top of the drawing paper, the lower opaque sheet of the carrier contacting the lower sensitized side **97** of the sheet **91** being first withdrawn and placed on top of the transparent blanket to protect the sensitized sheet against exposure when the upper opaque sheet of the carrier is withdrawn, and, upon completion of the exposure period, the upper opaque sheet of the carrier being immediately reinserted, after which the lower opaque sheet of the carrier may be reinserted, and the carrier with the sensitized paper withdrawn.

It will be understood that within the scope of the appended claims wide deviations may be made from the form of the apparatus herein described without departing from the spirit of the invention.

I claim:

1. Portable apparatus for use in making contact prints of drawings and the like having, in combination, a support having a substantially continuous opaque lower wall portion forming an opening, a sheet of transparent flexible material carried by said wall portion adjacent its lower edge for closing said opening whereby said support may be placed on the surface having the drawing with said sheet in closely adjacent relation to said surface, light emitting means carried by said support above said sheet, said support having provision for movably supporting an opaque mask between said light emitting means and sheet, a vacuum pump carried by said support, said sheet having an orifice, and conduit means for connecting said orifice to the suction intake of said pump.

2. Portable apparatus for use in making contact prints of drawings and the like comprising a sheet of transparent flexible material adapted to be placed over the surface having the drawing, a support operatively adapted to rest on said surface in association with said sheet when the latter is so placed, light emitting means carried by said support above said sheet, said support having provision for movably supporting an opaque mask between said light emitting means and sheet, said sheet having an orifice, a vacuum pump carried by said support, and means for connecting the suction intake of said pump to said orifice.

3. Portable apparatus for use in making contact prints of drawings and the like having, in combination, a support having a substantially continuous opaque lower wall portion presenting a downwardly facing opening at the lower edges of said portion, a sheet of transparent flexible material carried by said wall portion for closing said opening whereby said support may be placed on the surface having the drawing with said sheet in closely adjacent relation to said surface, light emitting means carried by said support above said flexible sheet in spaced relation thereto, said lower wall portion having provision for operatively removably supporting an opaque

masking sheet between said light emitting means and said flexible sheet, a vacuum pump carried by said support, said flexible sheet having an orifice, conduit means connecting said vacuum pump to said orifice, and a gasket carried by said lower wall portion adjacent its lower edges for sealing the joint between said portion and the surface having the drawing.

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