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SHEET POSITIONING AND CLAMPING MEANS

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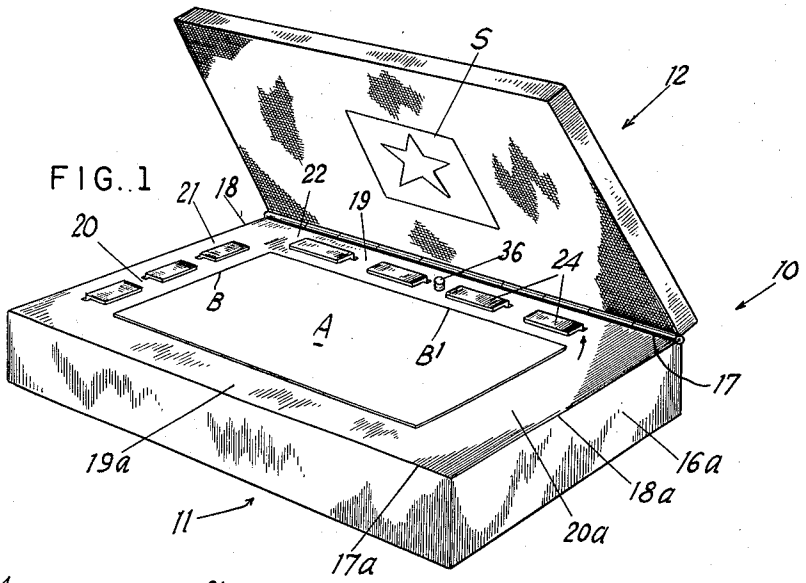

FIG. 1

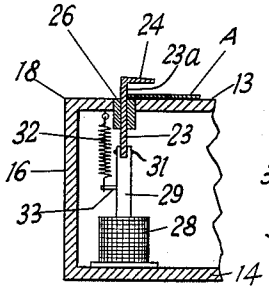

FIG. 2-A

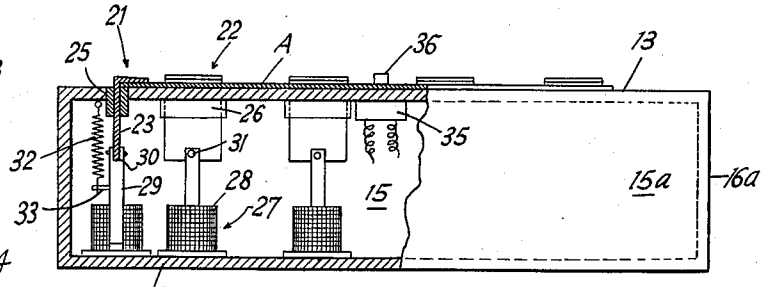

FIG. 2

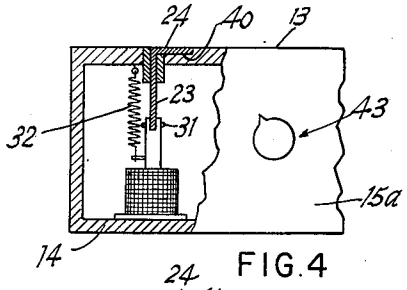

FIG. 4

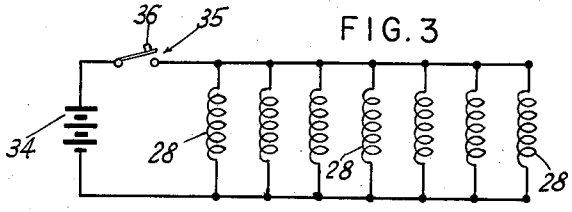

FIG. 3

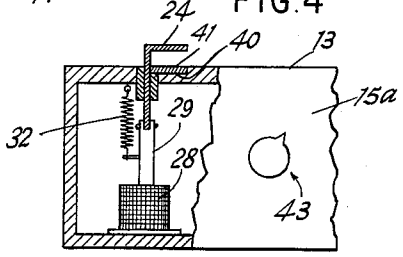

FIG. 5

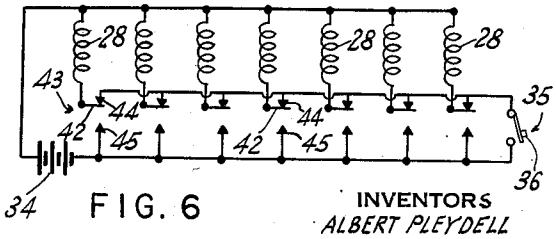

FIG. 6

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SHEET POSITIONING AND CLAMPING MEANS

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3 Claims. (Cl. 101—126)

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This invention relates to sheet positioning and clamping means. More particularly, the invention concerns the combination of a work supporting base and combined means for accurately positioning sheet material on the base and clamping the positioned sheet material on the base.

In the printing or graphic arts where sheet materials must be positioned on a base to receive an imprint thereon, it is desirable that guide or gauge means be provided for accurately positioning the sheet material on the base. This is particularly necessary in the silk screen process when sheets are to be printed with more than one color in accurate registry with one another. In this art it is conventional to provide the base of the silk screen printer with register guides in the form of paper or carboard tabs. Such guides require frequent replacement and change when there is a variation in the thickness of the sheet material being printed.

Accordingly, an object of this invention is to provide a base having a work supporting surface with improved, movable guide means thereon for accurately positioning a sheet on the work supporting surface, the guide means being movable to a position to clamp the sheet to the work supporting surface.

Another object of this invention is to provide in a silk screen printing device, movable gauge means for accurately positioning a sheet on the base thereof, the gauge means including clamping means for retaining the positioned sheet on the base, together with means for effecting movement of the gauge means to its clamping position, together with means for controlling the operation of the gauge moving means, the control means being responsive to the movement of the silk screen frame portion of the device toward and away from the base portion thereof.

Still a further object of this invention is to provide a base having a plurality of sheet gauging and clamping members movably mounted thereon, selected members being adapted to be moved from a sheet gauging position to a sheet clamping position while other members are moved to a non-functioning position wherein the other members do not interfere with the placement of a sheet on the base or the operation of the selected members.

Yet another object of this invention is to provide sheet positioning and clamping means which is of simple construction, of a rugged nature, and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

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The invention accordingly consists in the combination of elements and arrangement of parts, which will be exemplified in the devices hereinafter described, and of which the scope of invention will be indicated in the following claims.

In the accompanying drawing, in which is shown illustrative embodiments of the invention:

Fig. 1 is a perspective view of a device embodying the invention;

Fig. 2 is a longitudinal section of the base portion thereof, with parts broken away;

Fig. 2–A is a portion of the longitudinal section shown in Fig. 2, with the sheet positioning and clamping means shown in its elevated position;

Fig. 3 is a wiring diagram showing the connections for the operating means of the device;

Fig. 4 is a partial longitudinal section of the device, showing a modification thereof; with the sheet positioning and clamping means in its depressed position;

Fig. 5 is a sectional view similar to that of Fig. 4, with the sheet positioning and clamping means in its elevated position and

Fig. 6 is a wiring diagram showing the connections for the operating means of the device shown in Figs. 4, 5.

Referring in detail to the drawing, and particularly to Fig. 1, 10 designates a silk screen printing device. The same comprises essentially a rectangular shaped base 11 to which is hingedly connected the silk screen frame 12 on which stencil S is mounted, in the usual manner. The frame 12 is adapted to be moved towards and away from the base 11, as a part of the printing cycle, in a manner well known in the art.

The base 11 comprises a top wall which presents a smooth, planar work supporting surface 13, a bottom wall 14, side walls 15, 15*a*, and end walls 16, 16*a*. The top wall has longitudinal edges 17, 17*a* and transverse edges 18, 18*a*. The frame 12 is hinged to base 11 along edge 17, in a manner known in the art. The surface 13 includes longitudinal marginal portions 19, 19*a* and transverse marginal portions 20, 20*a*.

Sheet material A, which may be rectangular in shape, is adapted to be positioned on surface 13 in order to receive on its upper surface an imprint by way of the stencil S on frame 12, when the frame is lowered into contact therewith and color is applied to the interior of the frame, in a known manner. Means is provided for accurately positioning the sheet A relative to the surface 13. To this end, there is provided an angular gauge and clamp member 21 which is movably mounted

in marginal portion 20 of surface 13. A plurality of such members may be arranged in longitudinal alignment with one another, as shown in Fig. 1. Similarly, one or more angular gauge and clamp members 22 are movably mounted in marginal portion 19 of surface 13. The members 22 are similar in all respects to members 21.

Each of the members 21 is in the form of a right angle, having a vertical leg 23 and a horizontal leg or lip 24. The members 21 may be made of thin gauge steel or other suitable material. The legs or lips 24 may be tapered toward their outer ends, which are disposed toward the centre of the surface 13.

The marginal portion 20 of surface 13 is formed with an elongated slot 25 for each of the members 21. The slots are longitudinally aligned and disposed parallel to edge 18. Each of the slots 25 is provided with a rectangular bearing sleeve 26 for slidably receiving the leg 23 of members 21. The upper ends of sleeves 26 are flush with the surface 13. The sleeves 26 are accurately aligned relative to each other so that the inner surfaces 23*a* on legs 23 are disposed in a common plane. With the members 21 in their raised position, as shown in Fig. 2–A, the surfaces 23*a* provide gauge means adapted to be abutted by the left hand edge B of sheet A, as the sheet is moved across surface 13.

The members 22 are movably mounted in marginal portion 19 of surface 13, in the manner described in connection with members 21, the legs 23 of members 22 being disposed parallel to edge 17. The gauge surfaces 23*a* on the members 22 are also disposed in a common plane. Additionally, the members 22 are accurately located by means of their bearing sleeves 26, so that the plane including the surfaces 23*a* of members 22 intersects the plane including the surfaces 23*a* of members 21 precisely at 90°. With the members 21, 22 in their raised position, sheet A may be moved over surface 13 to bring the adjacent sheet edges B, B′ into abutment with the gauge surfaces of the respective members, thus accurately locating the sheet as a whole, relative to the surface 13.

As shown in Fig. 2–A, when the sheet A is properly positioned on surface 13, the legs or lips 24 of the members 21, 22 will overlie the marginal portions of the sheet. The members 21, 22 are adapted to be moved downwardly so that legs 24 thereof will clamp sheet A in its proper position on surface 13.

To this end there is mounted on bottom wall 14 of the base 11, a solenoid 27 beneath each of the members 21, 22. Each solenoid comprises a coil 28 and a vertically disposed, slidable plunger 29 which has a slotted upper end 30. The leg 23 of each member 21, 22 is received at its lower end in the slot 30 of a corresponding plunger 29. A cross pin 31 links each member to its operating plunger. The members 21, 22 are raised to their normal, elevated position, as shown in Fig. 2–A, by means of a spring 32 anchored at one end to the underside of the top wall of the base and attached at its other end to a lateral projection 33 on solenoid plungers 29. With the members 21, 22 raised to their elevated position, legs 24 thereof are disposed in substantially parallel relation to surface 13.

The coils 28 of the solenoids are connected in parallel with each other and with a source of current which may take the form of a battery 34, as indicated in Fig. 3. A normally open button switch 35 is connected between current source 34 and the interconnected coils 28. The switch 35 may be located on the underside of the top wall of the base, being disposed in marginal portion 19 and adjacent edge 17. The operating button portion 36 of the switch projects upwardly through a suitable opening in the top wall.

It will be apparent that upon properly locating sheet A on surface 13 by means of the gauge surfaces 23*a* on members 21, 22, the sheet is ready to be printed. Accordingly, the frame 12 is lowered to its working position to bring stencil S into contact with sheet A. As the frame is being lowered, the button 36 of switch 35 is engaged by the opposed portion of the frame and pressed downwardly to close the circuit which energizes the solenoids 27. This will cause members 21, 22 to move downwardly through the movement of the interconnected plungers 29, thereby moving legs 24 of the members to clamp sheet A against surface 13. The clamping action of members 21, 22 will be controlled due to the action of springs 32, thus avoiding crease marks on the sheet A. When the printing step is completed and frame 12 is raised in the usual manner, switch 35 will be operated to open the circuit and deenergize the solenoids, thus allowing springs 32 to raise members 21, 22 to their elevated position. The sheet A may then be readily removed and replaced by a new sheet which is positioned and clamped in the manner previously described.

It will be apparent that with the gauge surfaces 23*a* on members 21, 22 permanently located relative to surface 13, each sheet will be accurately positioned on the surface 13 and the members taking care of sheets of varying thickness. When a previously printed sheet is returned for application of other colors, accurate registration is made possible by the members 21, 22. In addition, the members in their clamping position, eliminate the possibility of accidental movement of the sheet on surface 13.

The number, spacing and dimensions of members 21, 22 may be varied to suit the size of the base 11 and the dimensions of the sheets to be printed. If desired a single set of gauge and clamp members may be used to position and clamp one edge only of a sheet, or a set of members may be used in conjunction with a fixed guide to position adjacent edges of the sheet.

The legs 24 on members 21, 22 will not interfere with the action of the silk screen frame 12 during the printing operation due to the thinness of the legs and the fact that they are disposed in the marginal portions of the sheet A.

In a modified form of the invention, selected members 21, 22 may be arranged to have their legs 24 depressed into recessed portions of surface 13, thus presenting smooth planar surfaces in the marginal as well as the central portions of surface 13. This is advantageous in cases where sheets are to be printed which have substantially reduced dimensions and therefore, requiring a limited number of the members 21, 22 for gauging and clamping the same. Also, if only one set of members are to be used, it would be desirable to depress the other set of members to a non-operating position. In addition it may be desired to depress one or more of the members in order to facilitate the movement of sheet A over surface 13.

Accordingly, as shown in Figs. 4, 5, the surface 13 is formed with recesses 40 which are complementary to the legs 24 of the members 21, 22 and adapted to receive the legs when the members are moved to their depressed position.

As shown in Fig. 4, the upper surface of leg 24 is then substantially coplanar with surface 13. Each of the recesses 40 is provided with a complementary shim 41 which may be removably placed therein. The shims 41 are placed in the recesses of those members 21, 22 which are to be used to gauge and clamp a sheet. Since the shims present a surface coplanar with surface 13, as shown in Fig. 5, they provide a clamping surface for the coacting legs 24 of the members.

It is also desirable that the non-working members 21, 22 be adapted to be moved to bring their legs 24 into their corresponding recesses 40, before the sheet A is positioned on surface 13. To this end, the solenoids 27 are wired as shown in Fig. 6. The solenoid coils 28 are connected together on one side to one side of battery 34 and each of the coils is separately connected on its other side to the movable switch blade 42 of a double pole switch 43. The fixed contacts 44 of the switches are connected together and are connected to one side of button switch 35. The other fixed contacts 45 of the switches are connected together and interconnect the other side of switch 35 and the other side of battery 34. The switches 43 may be suitably mounted on wall 15a of the base 11 for selective manual operation, the switch blades 42 being normally left in engagement with switch contacts 44.

Any one of the solenoids 27 may be independently energized by operating the corresponding switch 43 to move blade 42 into engagement with its contact 45, independently of the operation of button switch 35. Accordingly, each of the non-operating members 21, 22 is initially lowered by operation of their corresponding switches, thus bringing their legs 24 flush with surface 13. Shims 41 are placed in the recesses 40 of the operating members. After positioning sheet A on the surface 13, in the manner previously described, the frame 12 is moved down, thus operating switch 35 to energize the solenoids of the operating members 21, 22 and to thus clamp the sheet, as previously described.

It will thus be seen that there is provided sheet positioning and clamping means in which the several objects of the invention are achieved and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above described invention, and as various changes might be made in the embodiments set forth, it is understood that all matter herein set forth or shown in the accompanying drawing, is to be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, we claim as new and desire to protect by Letters Patent:

1. In a device including a base having a work supporting surface and a frame member movably mounted relative thereto, a member movably mounted on said base and including a gauge surface for positioning a sheet on said work supporting surface, said member including a portion for clamping said positioned sheet to said work supporting surface upon movement of said member in one direction, electromagnetic means operatively connected to said member for moving said member in said direction and switch means in circuit with said electromagnetic means operable by said frame member for controllng the operaton of said electromagnetic means.

2. In a silk screen printing apparatus comprising a base having a work supporting surface and a silk screen frame mounted for movement towards and away from said surface, sheet gauging means on said base comprising an angular member having a pair of legs substantially at right angles to each other, said means being arranged whereby one of said legs is movable in a direction substantially at right angles to said surface, while the other leg is disposed substantially parallel to said surface, a solenoid including a movable plunger, means for operatively connecting said plunger to the first mentioned leg of said gauging means, said solenoid being adapted to be energized to move the plunger thereof in a direction to bring the second mentioned leg of said gauging means toward said work supporting surface, a switch in circuit with said solenoid for controlling the movement of the plunger thereof, said switch including operating means adapted to be engaged by said silk screen frame upon movement thereof toward said work supporting surface.

3. In a silk screen apparatus comprising a base having a planar work supporting surface and a silk screen frame mounted for movement toward and away from said surface, a plurality of members movably mounted on said base and disposed in normally elevated position, each of said members including a gauge surface extending substantially at right angles to said work supporting surface and a clamping portion extending substantially parallel to said work supporting surface, said base being formed with a recess for receiving the clamping portion of each of said members upon downward movement of said members whereby the upper surfaces of the clamping portions of said members will be substantially coplanar with said work supporting surface, means for moving each of said members downwardly, means for controlling the operation of selected member moving means, and means responsive to the movement of said frame toward said work supporting surface for controlling the operation of the remaining member moving means.

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