Oct. 26, 1948. W. F. UHLIG 2,452,339

APPARATUS FOR PRINTING AND DRYING OF TEXTILE FABRICS

Filed Feb. 14, 1946 4 Sheets-Sheet 1

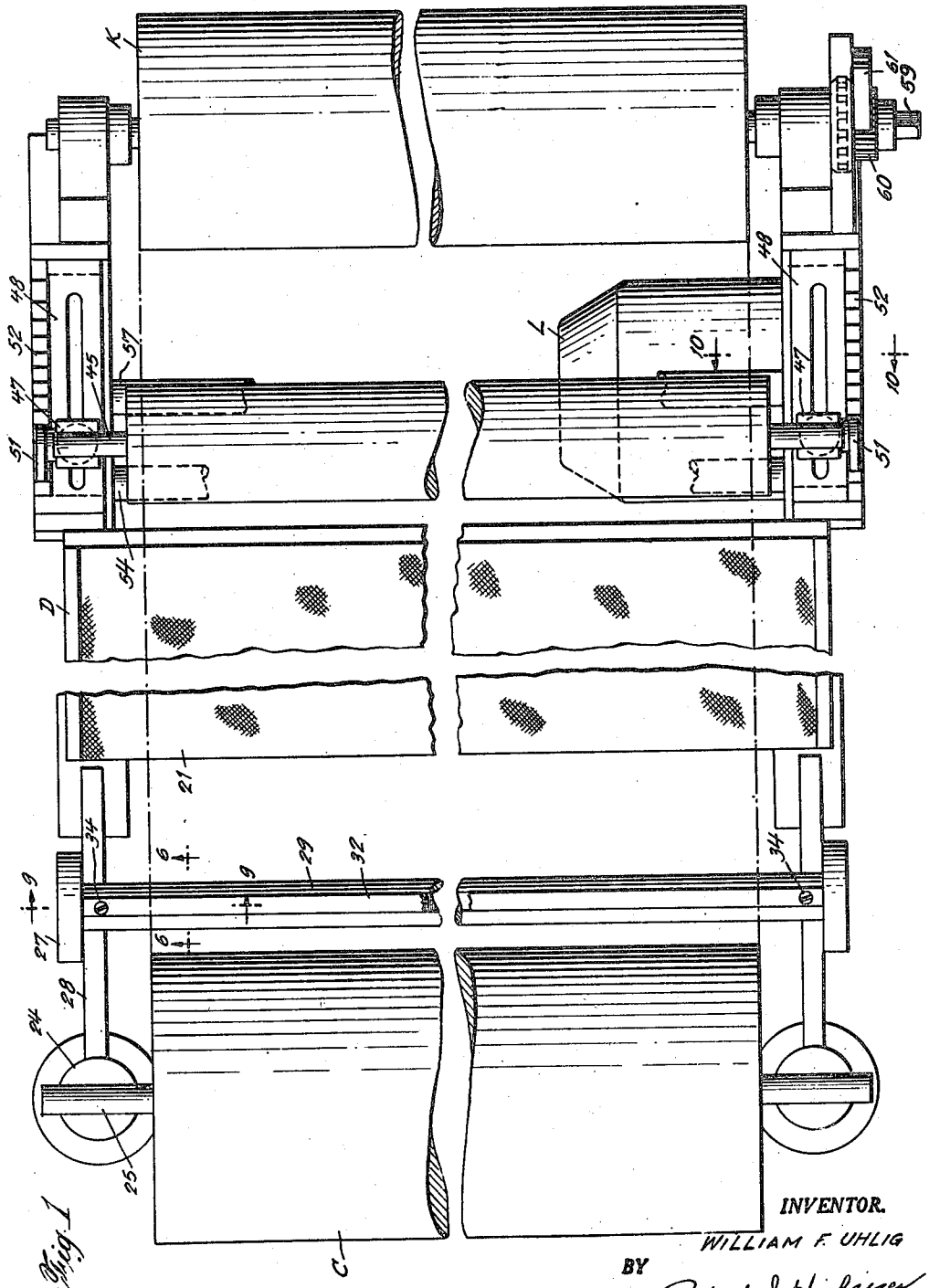


Fig. 1

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APPARATUS FOR PRINTING AND DRYING OF TEXTILE FABRICS

Filed Feb. 14, 1946 4 Sheets-Sheet 2

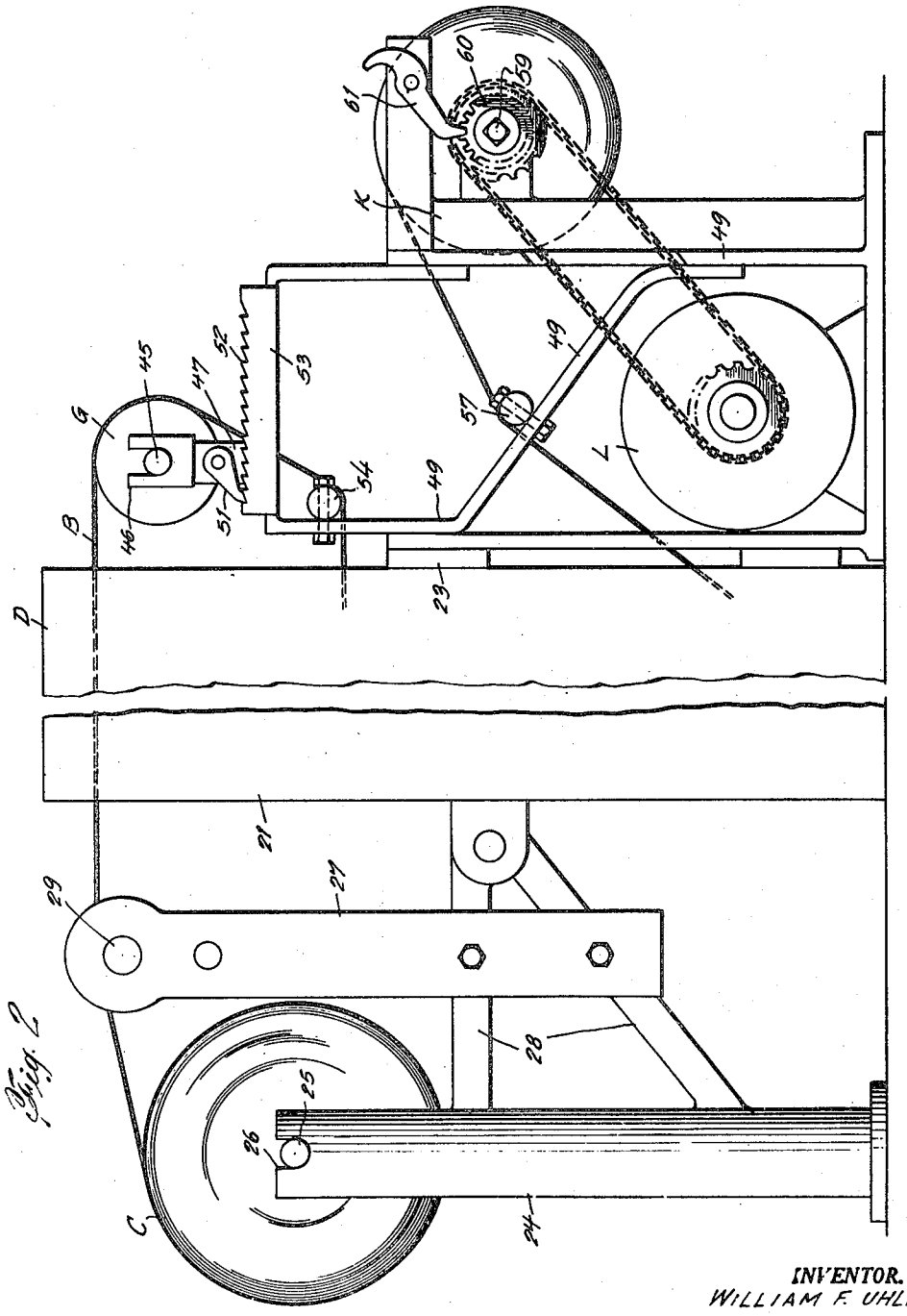


Fig. 2

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APPARATUS FOR PRINTING AND DRYING OF TEXTILE FABRICS

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Fig. 3

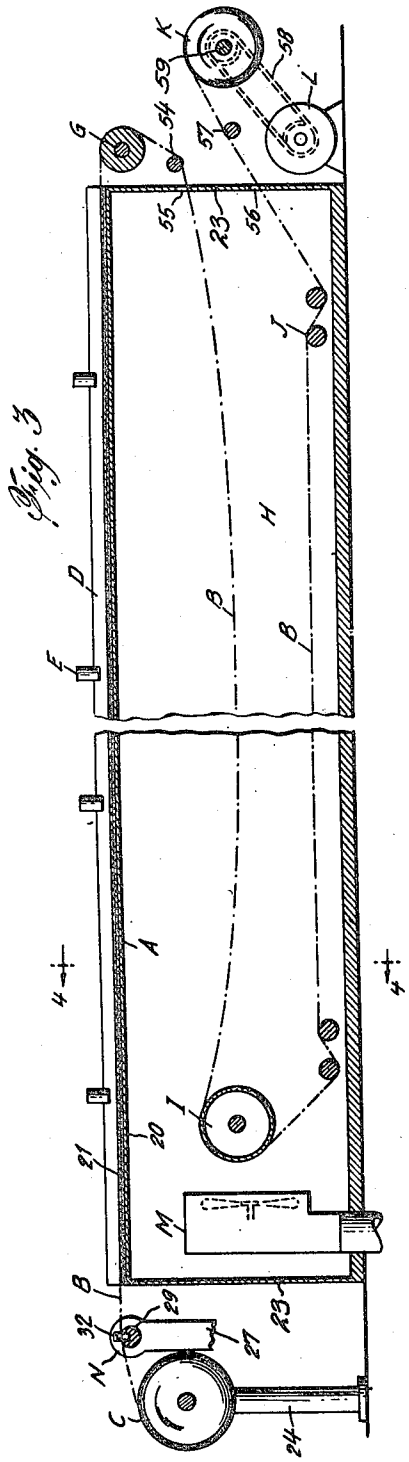


Fig. 5

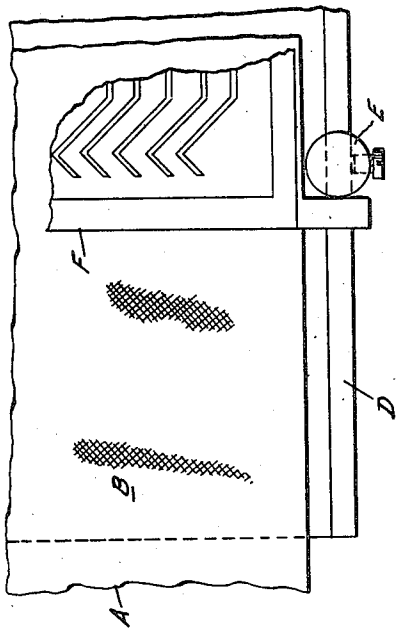
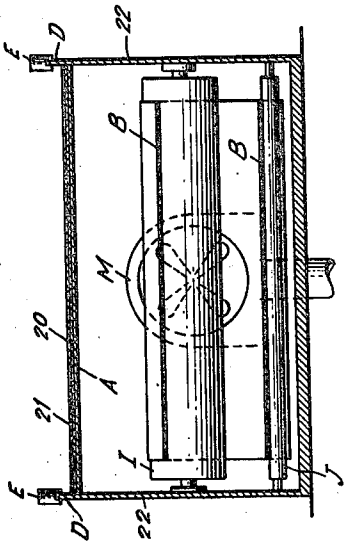


Fig. 4



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APPARATUS FOR PRINTING AND DRYING OF TEXTILE FABRICS

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Fig. 6

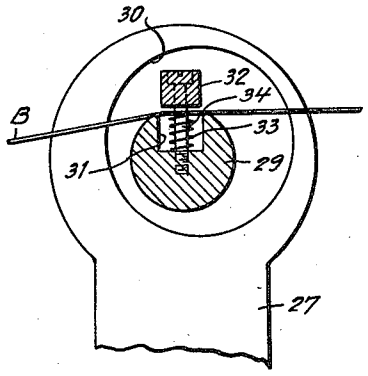


Fig. 7

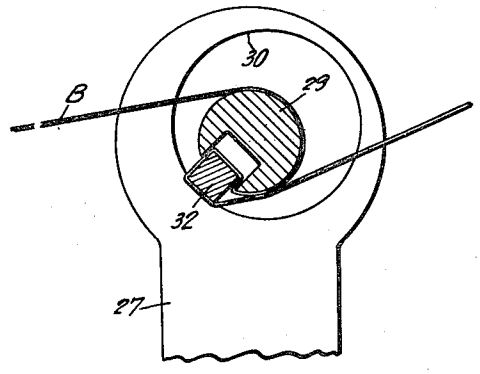


Fig. 8

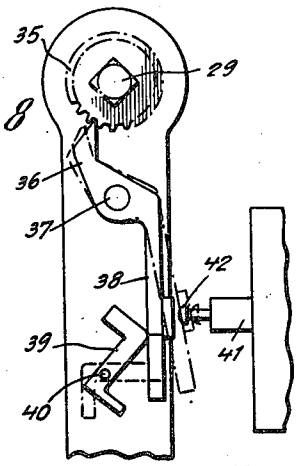


Fig. 9

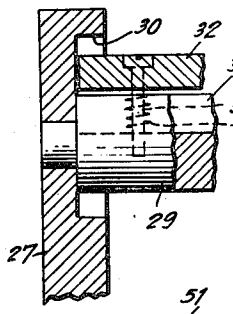
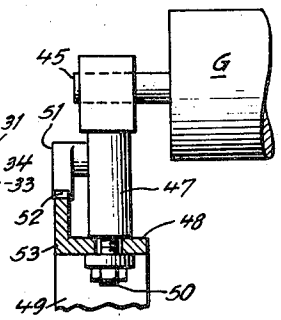


Fig. 10



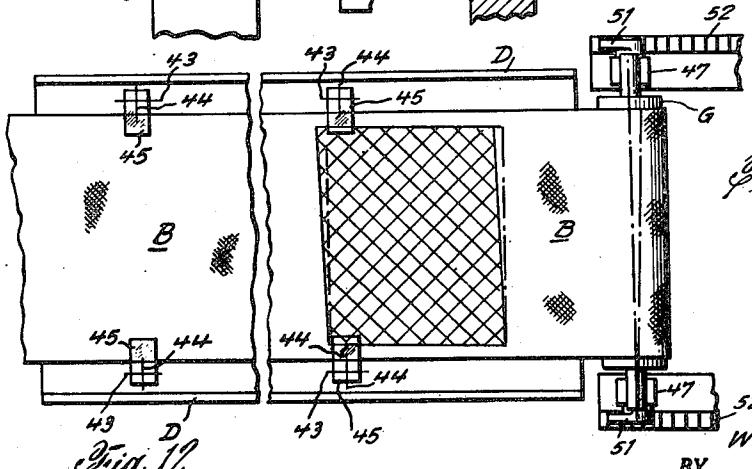


Fig. 11

Fig. 12

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UNITED STATES PATENT OFFICE

2,452,339

APPARATUS FOR PRINTING AND DRYING OF TEXTILE FABRICS

William Frank Uhlig, Newburgh, N. Y.

Application February 14, 1946, Serial No. 647,472

7 Claims. (Cl. 101—407)

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This invention relates to a new and useful improvement in a method and apparatus for stencil printing and drying of textile fabrics.

One of the objects of the invention is to conserve floor space required to produce a given quantity of goods per day.

Another object is to produce a much larger amount of goods in a much shorter time and with less floor space.

Still another object is to enable the goods when laid out on the table to be quickly and easily squared with respect to the table so that the warp and woof threads will lie in exactly proper line relation.

Yet another object is to produce printed goods from a continuous piece of material of any length without the necessity of the usual cutting and hanging to dry of a series of printed sections.

A further object is to eliminate the usual allowed 2% loss in material under the old methods.

Still a further object is to dry the material quickly and effectively under complete atmospheric control thus eliminating dirt, dust and the usual delay when the outside weather varies.

Another object is to provide an improved snubber for the material.

Still another object is to provide a simple and efficient device for quickly and easily adjusting the woof threads to keep the designs in exact alinement and prevent distortion of the design edges.

Further and more specific objects, features, and advantages will more clearly appear from the detailed description hereinafter set forth especially when taken in connection with the accompanying drawings which illustrate a present preferred form which the invention may assume and which form part of the specification.

Briefly and generally, the invention as a method comprises passing a sheet of material across a table, printing it thereon, and then passing it into a drying chamber beneath the table, and then passing it to a receiving roll.

Furthermore, the method comprises passing a continuous piece of material from a supply roll onto a table in successive sections to be printed thereon, passing each section into a drying chamber beneath the table, and passing the successive sections onto a receiving roll.

Yet further, the method comprises pulling a continuous piece of material off a roll and passing it in successive sections onto a table to be printed, and then passing each printed section in a zig-zag manner through a heated drying

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chamber disposed beneath the table, and then passing the material onto a receiving roll.

Another feature of the method is to suspend preceding printed sections of a continuous fabric in a heated drying chamber beneath a printing table while a succeeding section is laid on the table to be printed and then successively passing the printed sections out of said chamber onto a receiving roll.

Still another feature of the invention is to pull a length of material onto a printing table, uniformly to snub one end of the material at one end of the table across its entire width and then pull on the other end of the material non-uniformly across its width to adjust the woof threads to square them with the table.

As an apparatus, the device comprises a printing table over which successive sections of a continuous piece of material are intermittently laid and printed, in combination with a drying chamber beneath the table and adapted to contain at least two sections of previously printed material while a section is being printed on top of the table.

The invention further comprises a snubber roll at one end of the table to engage the material and, by turning, to snub the material uniformly all across its width, while at the other end of the table there is provided a guide roller over which the material passes and which has a shiftable axis to adjust the woof threads of the fabric as desired.

Whereas tables now in use are as much as 85 yards in length, and the sections are printed and then cut off and hung up to dry, in this device the same length of goods can be dried in a continuous manner with a table less than one fifth as long. This is done by providing a table 15 yards long with a drying chamber underneath which will accommodate two lengths of material each 15 yards long. Thus, whenever a section of material is on the table being printed there are at least two preceding printed sections in the chamber being dried under controlled temperature and atmospheric conditions.

A final feature of the invention includes cross-line guide marks on the table and on the goods to enable the alinement of the woof threads to be maintained so that when a design is printed on the fabric the woof and warp threads are in exact rectangular relation whereby the design when printed has true square edges without distortion.

The present preferred form which the inven-

tion may assume is shown in the drawings, of which,

Fig. 1 is a broken enlarged plan view of the apparatus;

Fig. 2 is a broken enlarged side elevation of the apparatus;

Fig. 3 is a broken longitudinal section through the apparatus;

Fig. 4 is a vertical cross section taken on the line 4—4 of Fig. 3;

Fig. 5 is a partial plan view of the printing table, showing a stencil frame in position thereon;

Fig. 6 is a vertical cross section taken on the line 6—6 of Fig. 1;

Fig. 7 is a similar view showing the snubber in a snubbing position;

Fig. 8 is a side elevation of the latching means for the snubbing device;

Fig. 9 is a partial vertical section taken on the line 9—9 of Fig. 1;

Fig. 10 is a vertical cross section taken on the line 10—10 of Fig. 1;

Fig. 11 is a partial plan view of the receiving end of the apparatus showing the means for shifting the woof of the fabric; and,

Fig. 12 is a small partial view of the guide cross lines at the delivery end of the table.

In order to get a general picture of the novel method and apparatus it is best first to refer to Figs. 3, 4, and 5 which give a general picture of the parts which will be referred to by letters after which the detail description of their structure will be indicated by numerals.

The apparatus comprises a printing table A about 15 yards long supported in any suitable manner and over which the sheet material B from a supply roll C passes. The top of the table as usual is provided with side flanges D carrying the usual stop members E whereby the stencil frames F are disposed in successive positions along the length of the material.

As is the usual custom, the material is pulled across the table until the table is covered and then the section thus disposed is pinned down. Then the usual stencil printing with the frames F takes place. After a section is printed, it is pulled further along to advance a fresh section from the roll C over the table to be printed so that successive sections are printed one after the other without separating them. The printed section just mentioned is passed over a guiding roller G and into one end of a drying chamber H where it generally traverses a zig-zag course over a roller I and around tensioning rollers or bars J. It then passes out of the drying chamber and is passed over a motor-driven receiving roller K driven through suitable connections by motor L. At the supply end of the chamber H there is disposed a drying unit M which is of any modern type to propel controlled heated air along the chamber H whereby the suspended sections of printed material are dried under accurate control and in a much shorter time than is now the case.

In fastening the successive sections of the material on the table and alining them so that the warp threads run truly longitudinal of the table and the woof threads truly transversely of the table, I have provided at the supply end a snubber mechanism N so that while being printed the material is firmly gripped uniformly along its entire width at that end. To insure that the threads at the other end of the material are disposed also true and that consequently the entire length is

laid out accurately, I also provide the guide roller with shiftable bearings for its supporting shaft so that it can be shifted easily and at will to properly aline the woof threads and exert a pull on the material which will insure that the designs stencilled on it will have true edges when the tension on the material is released.

The construction in detail is as follows:

The printing table A is covered with a layer of felt 20, overlaid preferably by a layer of canvas 21. The table is underneath supported by suitable legs (not shown) and enclosed by side walls 22 and end walls 23 of sheet metal to form the drying chamber H. The supply roller C is supported on pedestals 24 which receive its shaft 25 in slots 26 in the upper ends thereof. As the material tangentially passes from the roller C it encounters the snubber mechanism N which is comprised as follows:

Referring particularly to Figs. 1, 2, 6, 7, 8, and 9, it will be seen that the snubber mechanism comprises upright legs 27 supported from brackets 28 connected to the pedestals 24. These legs receive the ends of the snubber rod 29 and have interior circular recesses 30 with respect to which the axis of the snubber rod 29 is eccentrically disposed. The snubber rod is provided with a longitudinal slot 31 extending all the way across the rod and in this slot there is disposed to lie a snubber element or bar 32 the ends of which extend into the recesses 30 and which bar 32 is forced into an outward position to project beyond the upper edge of the slot 31 by means of a pair of springs 33 encircling pins 34 fastened to the bar 32. In its normal position, the bottom of the bar 32 as shown in Fig. 6 is disposed above the top of the rod 29 and through this gap the material B passes to move onto the table A without resistance. However, when a suitable section or length of material has been pulled off the roll C to cover the table A, it becomes necessary to snub the material all across its width by some means which will engage and snub it uniformly thereacross. Therefore, to snub the material and hold it tight while it is being printed, as far as the supply end of the material section is concerned, the snubber rod is turned by any suitable means such as a handle (not shown) and when this happens the rod and the bar 32 are moved to the position shown in Fig. 7, whereby the eccentricity of the circular recess 30 with respect to the rod 29 will cause the bar 32 to be pushed into the slot 31 and snub the material A therein as shown. This will hold the material tightly and uniformly across its entire width and will prevent its woof threads at least at this end being pulled out of line with respect to the warp threads or to curve them and thus this action holds them at right angles to the length of the table as it is desired they be disposed.

When the snubber is tightened up means are provided to hold it in this tightened position until definitely released and this mechanism is as follows:

The right hand end of the snubber rod 29 is provided with a ratchet gear 35 (see Fig. 8) engaged by a ratchet tooth 36 pivoted at 37 to the leg 27 and having downwardly extending arm 38 bearing against a Z-shaped member 39 pivoted at 40 on said leg. A switch member 41 is disposed adjacent the arm 38 on the body of the frame of the apparatus and has a button 42 which, when pushed in, closes a part of the circuit for the motor L but tends to move outwardly unless pressed in. When the tooth 36 engages teeth of

gear 35 and the stop member 39 is in the position shown in full lines in Fig. 8 the arm 38 is back and not pushing on button 42. This is the position when the material is being snubbed and the motor should not be operated. However, when the stop member 39 is moved to the other position shown in dotted lines in the figure, then it pushes against the lower end of arm 38 and pushes button 42 in and closes the motor circuit at least in part. This movement will at the same time release the tooth 36 from the gear 35 and permit the snubber rod to be moved to the position so that the material may be released so that it can be moved again across the table.

When the series of identical designs to be stencil-printed on the material of the section are made, and before the material is unpinned to move a new section into position across the table, sets of transverse and longitudinal cross lines are marked on the table on the opposite sides of the material with the transverse cross lines lined up with the rear edges of the first design and with the longitudinal cross lines disposed respectively at determined distances from either one of the side flanges D of the table. These longitudinal and transverse cross lines are numbered 43 and 44 in Fig. 12. The transverse lines are preferably disposed each a desired distance from the adjacent respective edges of the material as it is pinned down.

Now considering the last design of the series at the far or delivery end of the table as shown in Fig. 11, another set of cross lines are disposed as above mentioned a repeat distance beyond the rear edge of the last design with longitudinal lines the same distance apart as the ones just above described. Now, when the material is ready to be moved and before that happens, a piece of paper 45 preferably transparent is placed on the edges of the material adjacent the first set of cross lines and cross lines are drawn on it in line with those on the table, it being understood that the paper extends beyond the edge of the material far enough to lie over said cross lines on both sides of the sheet. These pieces of paper are shown in Fig. 12. This gives an accurate guide on the material of the relation of warp and woof threads to be maintained. Therefore, when the material is unpinned and moved down to lay a fresh unprinted section across the table for printing the next series of the same design, the first design above mentioned is moved down the table several inches beyond the cross lines at that end of the table. Then the material is snubbed and the snubber is turned around far enough to bring the pieces of paper on the material back to be substantially in line with the nearby cross lines so that the transverse lines on the table and the material will coincide as nearly as possible. If they do not it is because the woof threads are not exactly at right angles to the table and this deviation is corrected by shifting the axis of the guide roller G over which the material passes before it enters the drying chamber H. It will then be seen that with this adjustment the transverse lines on the table and on the paper on the material are brought into alinement and thus insure the proper relative position of the woof threads. This tightening of the snubber also pulls up on the whole length of the material not only on the table but within the chamber H so that it will not sag too much and keep it under proper tension at all times. With regard to the longitudinal lines on the pieces of paper, if when they are moved down the table and the transverse

lines are alined in the above manner, the longitudinal lines on the material are not in coincidence with those on the table at that point then the operators can pull the material laterally in pinning it down to make these two sets of lines meet. Thus the full length and width of the material is laid down section after section with the most possible accuracy and with much more speed than before and with much less time and effort on the part of the operators. This operation facilitates the efficiency and ease of manufacture beyond comprehension and yet is extremely simple.

To bring the edges of the design back into position if they are out of true is the object of the next feature of the invention which is illustrated in Figs. 1, 2, 10, 11, and 12 and is comprised as follows:

The guide roller G over which the material B passes just before it enters the drying chamber H has a shaft 45 the ends of which are received in slots 46 in the upper end of blocks 47 which slide back and forth on the upper face of a frame plate 48 supported on a framework generally denoted by the numeral 49 which also acts as a support for the receiving roll K as well as for the drive motor L. The blocks may be held on the plate 48 slidably by means of bolts and screws 50. To the sides of each block 47 is pivoted a pawl 51 adapted to engage the teeth 52 of a rack plate on flange 53 disposed at the side of the plate 48. The blocks may be independently moved back or forward and thus shift the axial line of the shaft 45 and thereby exert a directed pull on the fabric at the receiving end to adjust the lines of the design in accordance with the showing in Fig. 11 so that the woof threads may be kept in rectilinear position with respect to the warp threads. This mechanism therefore can be seen to constitute a means for shifting the axis of the material guiding roller at the receiving end.

Therefore it will be obvious that after the length of material is pulled over the table to be printed it has means at the supply end to snub the material uniformly across its entire width and at the other end is provided with means to nonuniformly pull on the goods along the width to place the woof threads in proper alinement to keep the designs in the exact position which is especially needful when overlay designs are to be employed in which instance the print of one design must be in exact position to receive the next overlay.

Reference to Fig. 3 will clearly show that the material as it leaves the roller G passes under a guide bar 54 and through a narrow slot 55 in the end wall of the drying chamber and then passes in a long downwardly curving manner to and around the roller I. The material is allowed to droop in this fashion so that the same length of material as has just been printed will now extend from the roller I to the slot 55 with the printed side down and exposed to the heated air in the chamber H and be dried during the time that the next succeeding section of the material is disposed on top of the table A to be printed in turn and before it becomes necessary to bring it into contact with the roller I. Thus when it does pass around the roller I it is sufficiently dried not to smear the design on the fabric.

As the section on top of the table A is then printed, the motor L is started and the just printed section is moved to the position in the heating chamber H between the slot 55 and the roller

I and the preceding section, which has by that time been dried partly, will pass on and be disposed between the roller I and the lower slot 56 disposed in the end wall of the chamber H just below the slot 55. The material in this sectional lap of its movement within the chamber H will pass over and under the pairs of guiding and tensioning bars J above mentioned and be kept from sagging to the floor of the chamber H. All during this time, of course, the drying unit M has been passing heated clean air along the chamber H in contact with both the upper and lower layers of material, which are passed in this zig-zag manner through the chamber H. Thus the heating chamber at all times has in it printed sections of continuous material in length twice that of the section on the top of the table and about to be printed. After the material passes through the slot 56 it passes over a guiding bar 57 and then is wound up on the receiving roller K which is connected to and driven from the roll L by means such as chains 58. Preferably (Fig. 2) the motor shaft 59 is provided with a rack gear 60 engaged by a pawl 61 to permit the roll to be moved in one direction but preventing its movement in the opposite direction.

OPERATION OF THE METHOD AND APPARATUS

1. *Laying a section to be printed*

A roll of unprinted material is placed on the pedestals 24 with its shaft ends 25 lying in the slots 26. The material is then passed beneath the snubber bar 32 which is in its normal position away from the rod 29 and is pulled across the table A. If this is the very start of a printing operation, the end of the material is sewed to a dummy length of material which has already been passed under the table around the roller I and back and around the receiving roll K in order that provision is present to pull the new roll by power from the motor off the supply roll C. If the process is a continuation of a printing of the same design then the new roll end is sewed to the end of the old roll before that end passes under the table into the drying chamber H.

2. *Snubbing the supply end of section*

The snubbing rod 29 is turned from the position shown in Fig. 6 to that shown in Fig. 7 or beyond as desired so that the material near the supply end is firmly gripped and held across its entire width uniformly. The fact that the bar 32 is at exactly right angles to the table and the direction of movement of the goods insures that it will form a firm base from which to pull the material out flat and true from the other end through the shiftable guide roller G.

3. *Marking the rear edge of the first printed section*

As above stated, with the printing of the first section of designs, the sets of cross lines at each end of the section are properly disposed as described and pieces of paper or other material are placed on the goods at the first section with cross lines on them coincident with the table lines therebeneath. Then when the section is moved the first design is moved up several inches beyond the far cross lines and then snubbed back to aline the sets of transverse lines on the paper with those on the table and then with longitudinal pull on the material by the shifting of the axis of the roller G the said lines can be exactly alined. The material is then pinned down by the operators

and they see that the longitudinal lines on the material are coincident with those on the table.

4. *Power safety device*

As the snubber rod 31 is turned to snub the material the pawl 36 will automatically engage the rack gear 35 and hold the rod in its advanced position. The stop member 39 will be retracted as shown in Fig. 8 and the switch button 42 will be in "off" position so that the motor circuit cannot be energized. When the stop member is moved to its forward position then the button is pressed and the pawl is released so that the snubber rod can be turned to release the snubber bar 32 from the material to allow the motor to move it along the table A.

5. *Drying the material and roll-up*

After any section or length of material has been disposed on the table A and printed it is then pulled by the motor L through the intermediary of the succeeding sections around the roller G and into the heating chamber H until the front portion of the design just printed almost reaches the roller I. By this time a new design section of material has been pulled across the table and is treated as above described. During this preliminary treatment and printing, the preceding section is drying as well as the second preceding section which is disposed between the roller I and the receiving roller K. This operation goes on indefinitely until the material on the roll C runs out and even then can be continued by merely sewing the front end of a new roll to the rear end of one already printed before it leaves the table A. Therefore the process or method and apparatus can be continued as long as the supply of material holds out. There are at least three lengths of material always in the apparatus, one length on the table being printed, and two beneath the table in the drying chamber. By the combination of the snubber and the swivel action of the guide roller G the weave of the material can be maintained to lie square at all times.

6. *Advantages of the method and apparatus*

By this device a table only 15 yards long can handle 45 yards of material at one time thus saving space on the floor and reducing the size of loft required.

The material is handled in a continuous manner and in a continuous piece of indefinite length, requiring no cutting and hanging of the material to dry thus saving much time and requiring much less labor.

The present device can be operated to produce several times as much work in a given length of time as the former methods and apparatus.

The material can be adjusted quickly and easily to accurately adjust and maintain the square of the cloth, so that all designs are truly disposed on the material and can be overlaid with great accuracy.

The usual loss usually allowed in the cutting of the goods is practically eliminated by avoiding the need for cutting off each section and hanging it up.

The drying of the goods is under strict control and dirt and dust and weather conditions have no effect on the goods thus avoiding many difficulties.

While the invention has been described in detail and with respect to a present preferred form which the invention may assume, it is not to be

limited to such details and form since many changes and modifications may be made in the invention without departing from the spirit and scope of the invention in its broadest aspects. Hence it is desired to cover any and all forms and modifications of the invention which may come within the language or scope of any one or more of the appended claims.

What I claim as my invention, is:

1. An apparatus for printing and drying textile fabric which comprises a printing table, a drying chamber disposed beneath the table, means for pulling successive sections of a continuous sheet of material across the table to be printed, means at one end of the table for snubbing the material uniformly across its entire width, means at the other end of the table for adjusting the material to adjust the woof threads therein, and means within the chamber to suspend at least two lengths of material therein while another length is on the table being printed.

2. An apparatus for printing and drying textile fabric which comprises a printing table, a drying chamber disposed beneath the table, means for pulling successive sections of a continuous sheet of material across the table to be printed, means at one end of the table for snubbing the material uniformly across the entire width thereof, means at the other end of the table for adjusting the material to adjust the woof threads therein, and means within the chamber to suspend at least two lengths of material therein in a zig-zag path, while another length of material is on the table being printed.

3. In combination, a printing table across which a sheet of fabric is disposed for printing, a snubbing means at one end of the table, and comprising a rotatable slotted rod, a bar disposed in said slot and normally disposed out of the slot to permit material to pass between it and the rod, cam means engaging the ends of the bar and adapted when the rod is turned from normal position to force the bar into the slot to grip the material uniformly along its entire width when the rod is turned.

4. In combination a printing table across which a sheet of fabric is disposed for printing, a snubbing means at one end of the table and comprising a rotatable slotted rod, a bar disposed in said slot and normally disposed out of the slot to permit material to pass between it and the rod, cam means engaging the ends of the bar to force the bar into the slot to grip the material uniformly along the entire width thereof when the rod is turned, a ratchet and pawl mechanism connected to the rod and adapted to hold the rod when the pawl is in one position, a switch element normally in an open position, an arm on the pawl disposed adjacent the switch element, and stop means

movable to engage the arm to move the switch element to closed position and to release the pawl from the ratchet at the same time.

5. In combination a printing table across which a sheet of fabric is disposed for printing, a guide roller disposed at one end of the table over which the material passes, blocks on which the guide roller is mounted and rack and pawl means associated with said blocks to adjust the axis of the roller along different lines to adjust the woof threads of the material.

6. In combination, a printing table across which a sheet of material is disposed stationary to be printed thereon, means at one end of the table to grip the sheet firmly transverse to its length, a guide roller at the other end of the table and over which the material is disposed under tension, and means for shifting the axis of the roller to adjust the woof threads of the material while the sheet is stationary on the table and before it is printed.

7. In combination, a printing table across which a sheet of material is to be disposed stationary to be printed thereon, means at one end of the table to grip the sheet firmly transverse to its length, guide marks at that end of the table on opposite sides of the material, similar guide marks on the table at the other end thereof on opposite sides of the material and a predetermined distance from the first mentioned guide marks, guide marks associated with the material on opposite sides thereof and related to a particular design printed thereon, the marks on the material formed in exact alinement and in coincidence with the first marks on the table after the design has been printed, means for moving the material along the table, a guide roller at the other end of the table and over which the material is disposed under tension, and means for shifting the axis of the roller to adjust the marks on the material in alinement with the second set of marks on the table if, when the material is moved to the other end of the table, said marks on the material are not in alinement with the marks on the table at said other end whereby the woof threads may be kept in proper relation to the warp threads.

WILLIAM FRANK UHLIG.

REFERENCES CITED

The following references are of record in the file of this patent:

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