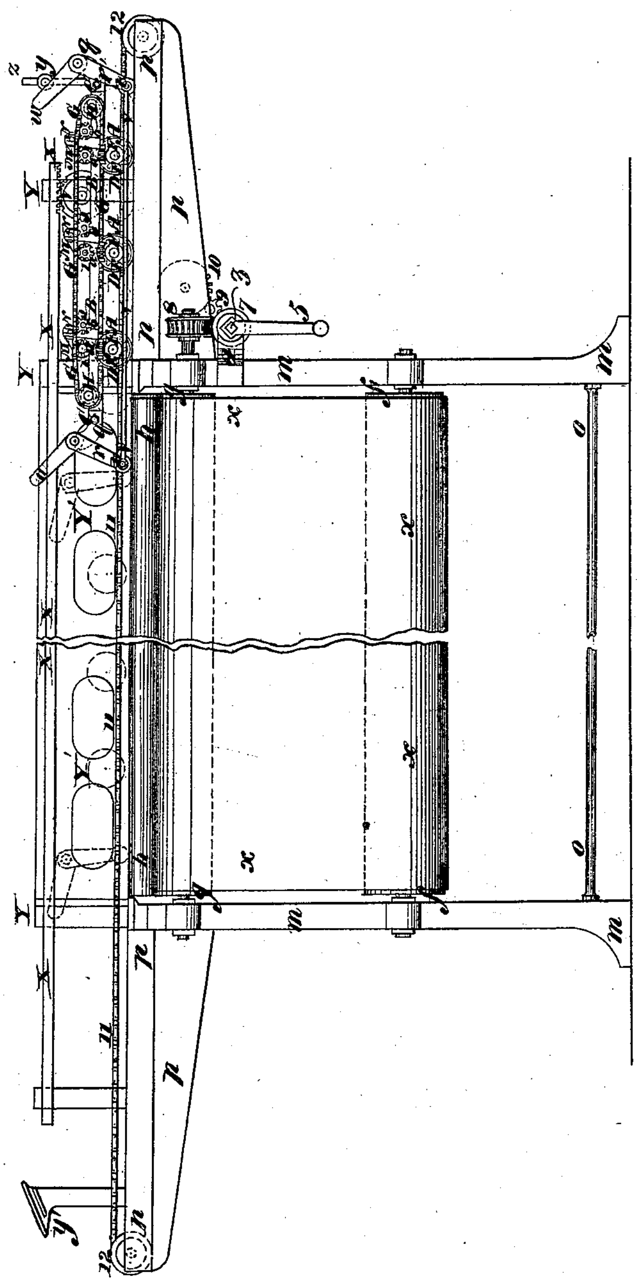
3 Sheets—Sheet 1.

W. IRELAND.

MACHINE FOR PRINTING TEXTILE FABRICS.

No. 188,370. Patented March 13, 1877.



George Macaulay-Cruikshank Witness
David Drysdale Easton Witness

William Ireland
C. S. Whitman, atty

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

3 Sheets—Sheet 2.

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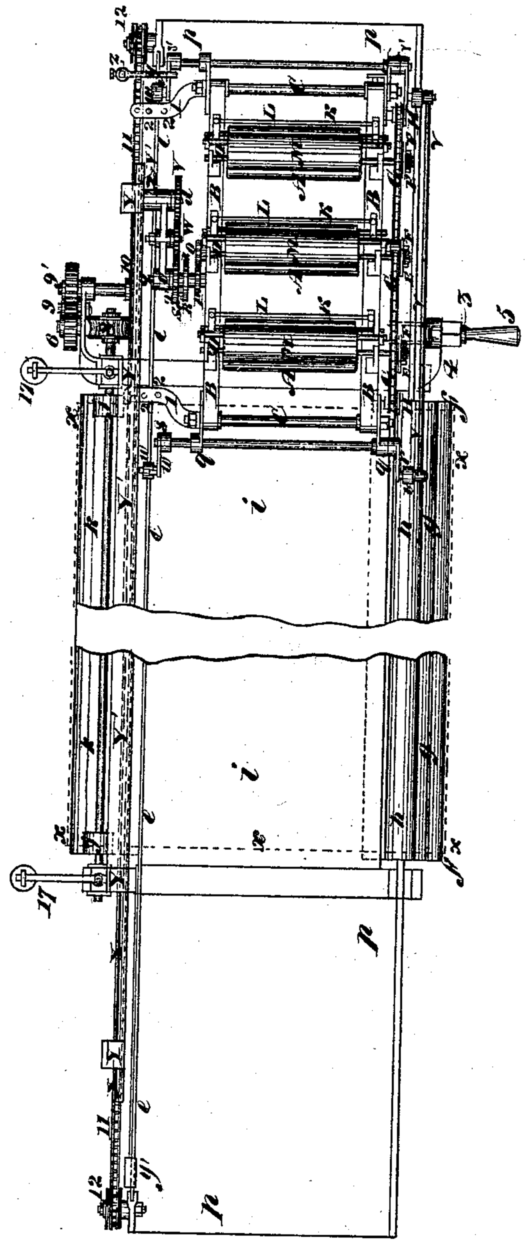

George Macaulay Cruikshank Witness
David Drysdale Austin Witness

William Ireland
CS Whitman atty

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

3 Sheets—Sheet 3.

W. IRELAND.

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FIG. 3.

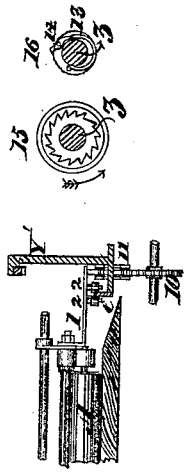


FIG. 2.

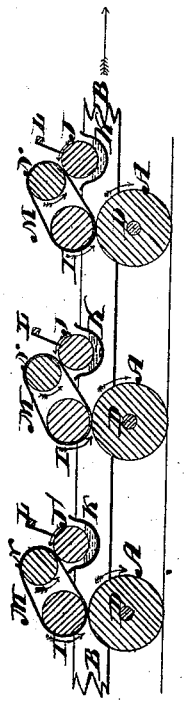
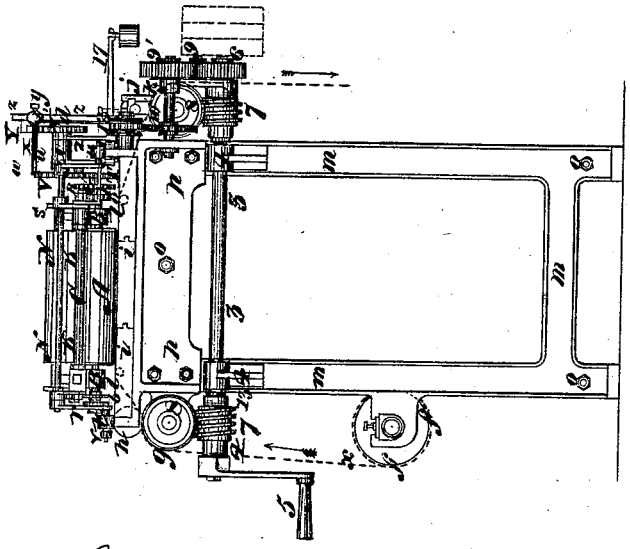


FIG. 1



George Macaulay Cruikshank Witness.
David Reynolds Winston Witness

William Ireland
C. A. Whitman atty

UNITED STATES PATENT OFFICE.

WILLIAM IRELAND, OF BUCKHAVEN, NORTH BRITAIN.

IMPROVEMENT IN MACHINES FOR PRINTING TEXTILE FABRICS.

Specification forming part of Letters Patent No. **188,370**, dated March 13, 1877; application filed May 1, 1875.

To all whom it may concern:

Be it known that I, WILLIAM IRELAND, of Buckhaven, in the county of Fife, North Britain, manufacturer, have invented Improvements in Machines for Printing Textile Fabrics, and in the machinery or apparatus employed therefor, of which the following is a specification:

This invention, which relates to improvements in printing, is adapted for distributing color, such as paint, on textile or similar web fabrics, with the view of producing patterns or designs thereon, or for producing a one-colored surface. The invention is specially applicable for printing the patterns on floor-cloth and other analogous purposes.

The mechanism consists of one or more printing-rollers, carried in a horizontal frame. Each printing-roller may be provided with a color trough and distributers, and also with a scraper or "doctor" for regulating the quantity of color taken up and distributed to the rollers. The frame and roller or rollers are caused to move over the fabric, which is thereby colored with one color, or receives the impressions of the patterns cut upon the roller or rollers in more than one color. An apparatus is also provided to elevate the frame and roller or rollers from the fabric, so as to keep the roller or rollers out of contact therewith, when it is desired to traverse the machine back to its starting-point. This apparatus is, however, necessary only when printing in one direction.

In printing oil or floor cloth, instead of previously grounding the fabric with the usual number of coats of grounding or monotone, one or more of such coats may be dispensed with, and the pattern printed upon such partially-grounded fabrics, such printing of the pattern being repeated a sufficient number of times to give the pattern any desired thickness or body of color, the fabric being dried between each printing operation.

The figure on Sheet 1 of the annexed drawings is a side elevation, the figure on Sheet 2 a plan, and Figure 1, Sheet 3, an elevation at the driving end, of the apparatus constituting my invention. The printing-rollers A (three of which are shown, but of which there may be any greater or lesser number, a greater number than three being indicated by the dotted lines on Sheet 1) are carried in a frame, consisting of two side bars, B, tied together at the ends by stays C. The rollers A are fixed upon shafts D, which run in bearings secured to the frame B, and upon one end of the shafts D tangent-screw wheels or disks E are keyed or otherwise fixed. Between the disks E and the side of the frame B other disks F are placed loosely upon the shafts D, the outer sides of which carry tangent-screws, gearing with the tangent-screw wheels or disks E, their inner sides being provided with teeth gearing into an endless pitch-chain, G, which extends along the side of the framing B, and is supported upon pulleys H, situated at each end thereof. The tangent-screw and wheel or disk E is provided in order to afford facility for setting or adjusting the printing-rollers A on their axes to the positions required by the pattern or patterns cut upon the rollers A, for, by rotating the tangent-screw carried by the disk F, (the disk F being meanwhile held stationary by the pitch-chain G,) the tangent-wheel E, shaft D, and roller A are turned on their axes, and adjusted to any desired position relatively with the other printing-rollers. The pitch-chain G also imparts motion to the distributing and inking rollers I and J by gearing with pinions *a b* fixed upon the axes thereof. The inking-rollers J revolve in troughs K, (as seen more particularly at Fig. 2, Sheet 3, which is a vertical section, on an enlarged scale, of the arrangement of printing, distributing, and inking rollers,) which troughs K contain the coloring fluid to be applied to the rollers A.

While the apparatus is printing, the rollers J, A, I, and N revolve in the direction of the arrows, and the scrapers or doctors L are provided to remove superfluous coloring fluid from the rollers J. Endless webs M, of leather, india-rubber, gutta-percha, felt, American cloth, or other suitable material, are passed around the rollers I and N, by which the color is removed from the rollers J, and deposited upon the printing-rollers A.

To give uniform motion to all the rollers A, I, J, and N, the following arrangement of gearing (as shown more particularly on Sheet 2) is provided. Upon one end of the shaft D of one of the printing-rollers A a pinion,

O, is fixed, gearing with another pinion, P, carried upon a stud, Q, fixed to the framing B. Formed upon the pinion P, or fixed thereto, is a disk, R, on the side of which is situated a pawl or stop, S, governed by a spring, this being so arranged that a pin or projection, *c*, from the spur-wheel T will catch upon the pawl or stop S, and cause the disk R to revolve when the frame B is being traversed in the direction of the arrows, Fig. 2, Sheet 3. A bracket, U, is also situated upon the stud Q, having its outer end provided with a counter-shaft, *d*, upon each end of which spur-wheels V V′ are fixed, one of them, V, gearing with an intermediate wheel, W, and the other, V′, with a rack, X, situated above the apparatus, and supported by brackets Y, and a stay or girder, Y′. The wheel V′ is held up in gear with the rack X by means of an arm, Z, the lower end of which is provided with a roller running upon a rail, *e*, the arrangement being such that the framing B and rollers may be elevated or depressed without affecting the working of the hereinbefore-described gearing. The fabric to be colored or printed (indicated by the dotted lines *x*) is unwound from the beam *f*, and, after passing between the rollers *g* and *h*, is stretched across the table *i*, and thereafter passes between the rollers *j* and *k*. In printing or coloring certain light fabrics it is preferred to provide that portion of the axis between the rollers *j* with sharp-pointed teeth or pins, so that the fabric is caught by them, and pulled through between the rollers *j* and *k*; and, in order to keep the fabric tightly stretched between the pairs of rollers *g h* and *j k*, the roller *k* should be made slightly larger in diameter than the roller *g*, whereby the delivery end of the fabric is pulled slightly in advance, and the portion upon the table kept tightly stretched; also the motion of the fabric through the apparatus may be assisted by the employment of endless bands or sheets passed around the rollers *g* and *k*, and over the table *i*, and in lieu of furnishing the axis of the rollers *j* with pins or teeth to assist the passage of light fabrics, such light fabrics may be stretched upon a stouter fabric, such as floor cloth, and secured or laced thereto at the edges, and in this condition passed through the printing apparatus, after which they may be unlaced or detached from the stouter fabric.

The table *i* is covered with felt, cotton wadding, gutta-percha, leather, cloth, or other suitable elastic material, and is supported upon any number of frames or supports, *m n*, corresponding to the length of the table employed, each pair of which frames or supports are tied together by stay-rods *o*. At each end of the table *i*, and bolted to the frames *m n*, brackets *p* are situated.

In operating my invention, now described, the printing or coloring operation is effected only in one direction—that is to say, while the framing B and roller or rollers are being traversed in the direction of the arrows, Fig. 2. To raise the framing B, and keep the rollers A out of contact with the fabric while returning to their starting-point, an arrangement of apparatus hereinafter described is provided. Brackets *q* are bolted to the sides of the framing B, as shown, which brackets *q* carry shafts having levers *r r′ s s′* fixed to their extremities. The levers are provided at their lower ends with rollers *t*, which travel upon the top of the roller *h*, and upon a flange formed upon the brackets *p* in line with the roller *h*. The lower ends of the levers *s s′* are likewise provided with similar rollers *u u*, which run upon a rail, *e*, situated above and parallel to the table *i*, which rail *e* also guides the printing apparatus in a parallel course, as hereinafter described.

The axes of the rollers *t* on the levers *r r′* are connected by a link or connecting-rod, *v*, while the lever *s′* has an arm, *w*, set at an angle, and arranged so as to be acted upon by a stop, *y*, fixed to an upright bar, *z*, secured to the side of the bracket *p*.

When the frame B and rollers A have nearly performed their journey in the direction of the arrows the arm *w* upon the first lever, *s′*, encounters the stop *y*, situated at the end of the table, by which the arm *w* is depressed, and the levers *r r′* and *s s′* thrown into the position indicated in dotted lines on Sheet 1 of the drawings, in which position they are retained by a stop fixed to the frame B. The frame B and rollers A are thus raised clear of the fabric, in which position they are drawn back to their starting-point, where the other arm, *w*, of the lever *s* is acted upon by the angled guide *y′*, and the apparatus thereby lowered gradually to its normal position. To keep the framing B and rollers A in position while being traversed backward and forward, guides are arranged, consisting of brackets 1, Sheets 2 and 3, bolted to the side of the framing B, and provided with guide-rollers 2, placed with their axes in a vertical position, between which the rail *e* is situated, and whereby the printing apparatus is prevented from deviating from a straight course.

The hauling arrangement, whereby the framing B and rollers are traversed upon the table *i*, consists of a shaft, 3, carried in bearings 4 secured to the framing *m*, and operated by means of a handle, 5. A spur-pinion, 6, keyed or otherwise fixed to one end of the shaft 3, gears with an intermediate wheel, 9, which drives a spur-wheel, 9′, upon the axis of which is fixed a pitch-chain wheel, 10, the teeth of which gear with a pitch-chain, 11, extending parallel with the table *i* and carried upon chain-pulleys 12, situated at the extremities of the brackets *p*. The ends of the pitch-chain 11 are secured to the brackets 1, so that, by operating the shaft 3 (and, consequently, the gearing 6, 9 and chain-wheel 10) in a right or left hand direction, the printing apparatus is traversed over the table *i* and fabric laid thereon.

Fig. 3, Sheet 3, is a detail view, showing the bracket Y′ in vertical section and the relative positions of the pitch-chain 11 and wheel 10.

The shaft 3 also operates the rollers *g* and *k* (so as to present fresh portions of the fabric to the action of the printing-rollers A) by means of worm or tangent screws 7 placed loosely upon the shaft 3 and gearing with worm or tangent screw wheels 8, fixed upon the axes of the rollers *g* and *k*. Hubs or bosses 13 are fixed upon the shaft 3, and are provided with pawls 14, governed by a spring (as seen more particularly at the detailed end views 15 and 16, Sheet 3 of the tangent-screw 7 and hub or boss 13.) The pawl 14 works into an internal ratchet on the end of the tangent-screw 7, and by this arrangement the tangent-screw 7 is caused to revolve only when the shaft 3 is rotated in the direction of the arrow at 15—that is to say, when the printing apparatus is being traversed with the printing-rollers out of contact with the fabric, the tangent-gearing being so calculated that the number of turns of the shaft 3 necessary to traverse the printing apparatus back to its starting-point will also cause the necessary breadth of fabric to be drawn over the table *i*. So soon as the printing apparatus has arrived at the end of its printing movement or stroke, the shaft 3 is turned in the opposite direction, when the printed portion of the fabric is withdrawn from the table by the action of the rollers *g* and *k*, and a fresh portion presented to the action of the rollers A at the same time that the printing apparatus is being returned to its starting-point, the rollers A being meanwhile lifted out of contact with the fabric X by the mechanism hereinbefore described.

When the fabric to be printed or colored is of the description known as oil or floor cloth, a margin or selvage is left untouched by the ground color on each side of the web or piece. This margin may be preserved during the printing operation, either by causing it to pass beneath a shield or by allowing it to overhang the printing-table. In removing the freshly-printed fabric from the table this margin of untouched fabric is caught between the rollers *j* and *k*, and, as the rollers *j* bear only upon this margin, the freshly-printed portion of the fabric is uninjured by its transmission through or between the rollers *j* and *k*. To give the necessary griping pressure to the rollers *j*, levers and weights 17 are provided and caused to act upon the bearings thereof. Pressure may also be applied to the roller *h*, when such is found necessary.

In printing oil or floor cloth, instead of previously grounding the fabric with the usual number of coats of grounding or monotone, one or more of such coats may be dispensed with, and the pattern printed upon such partially-grounded fabric, such printing of the pattern being repeated a sufficient number of times to give the pattern any desired thickness or body of color, the fabric being dried between each printing operation.

I claim—

1. The shaft I, pinion O, and pinion P, carried upon the stud Q, bracket U, provided with counter-shaft *d*, intermediate wheel W, spur-wheels V V′, rack X, and arm Z, combined and relatively arranged as described.

2. The worm-screw 7, tangent-screw wheels 8, beam *f*, rollers *g h j k*, and table *i*, combined as and for the purpose described.

3. The combination of the frame B, provided with brackets *g*, levers *r′ s′*, rollers *t u*, connecting-rod *v*, arm *w*, stop *y*, and guide *y′*, as and for the purposes described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM IRELAND. [L. S.]

Witnesses:

GEORGE MACAULEY CRUIKSHANK,
DAVID DRYSDALE AUSTIN.