(No Model.) 3 Sheets—Sheet 1.

I. E. PALMER.

PROCESS OF STARCH CLEARING, &c., WOVEN FABRICS.

No. 346,602. Patented Aug. 3, 1886.

Fig 2

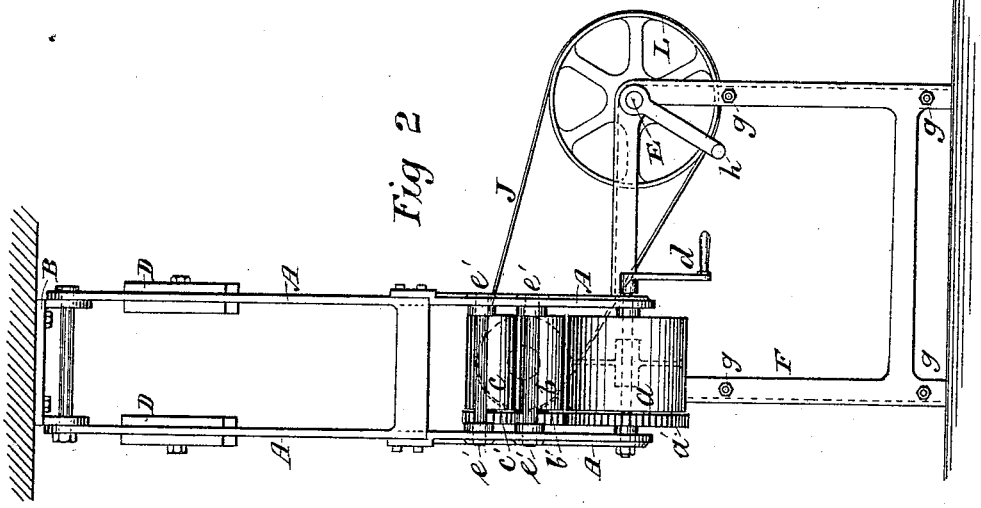
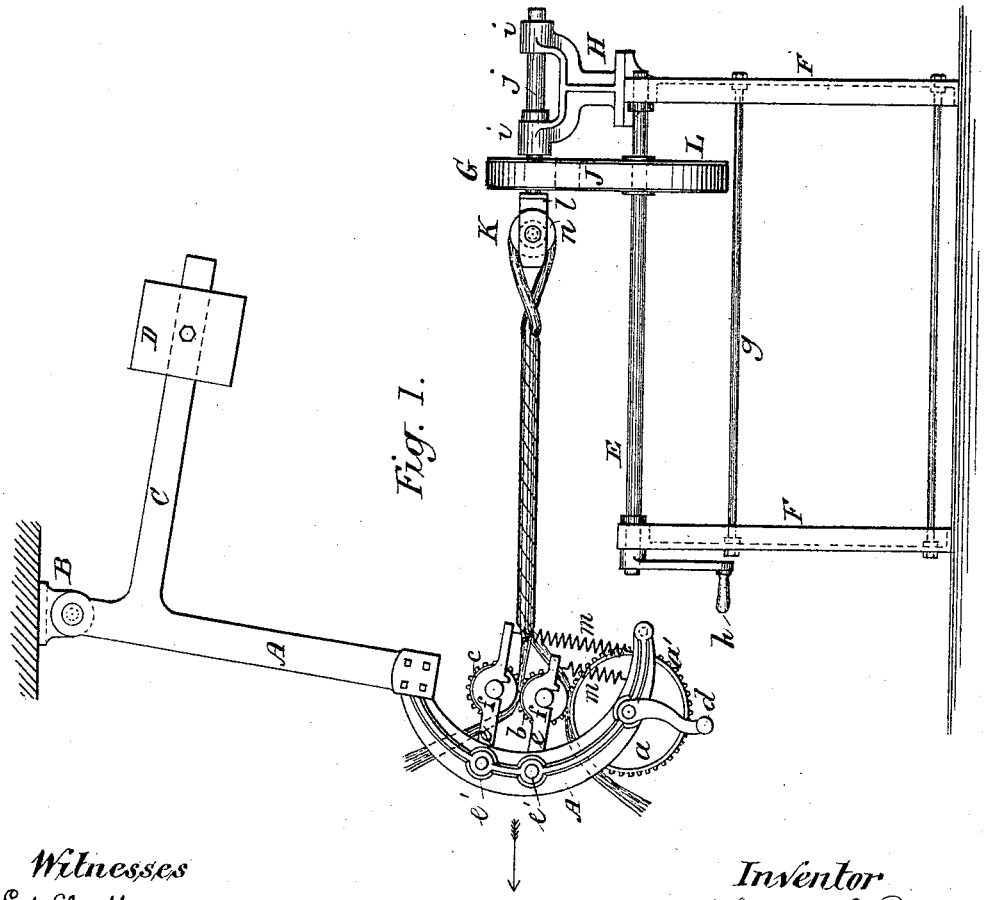


Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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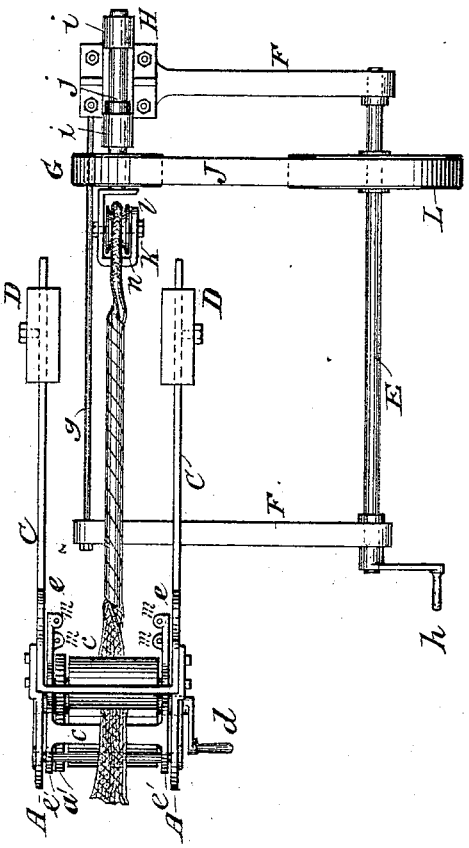
Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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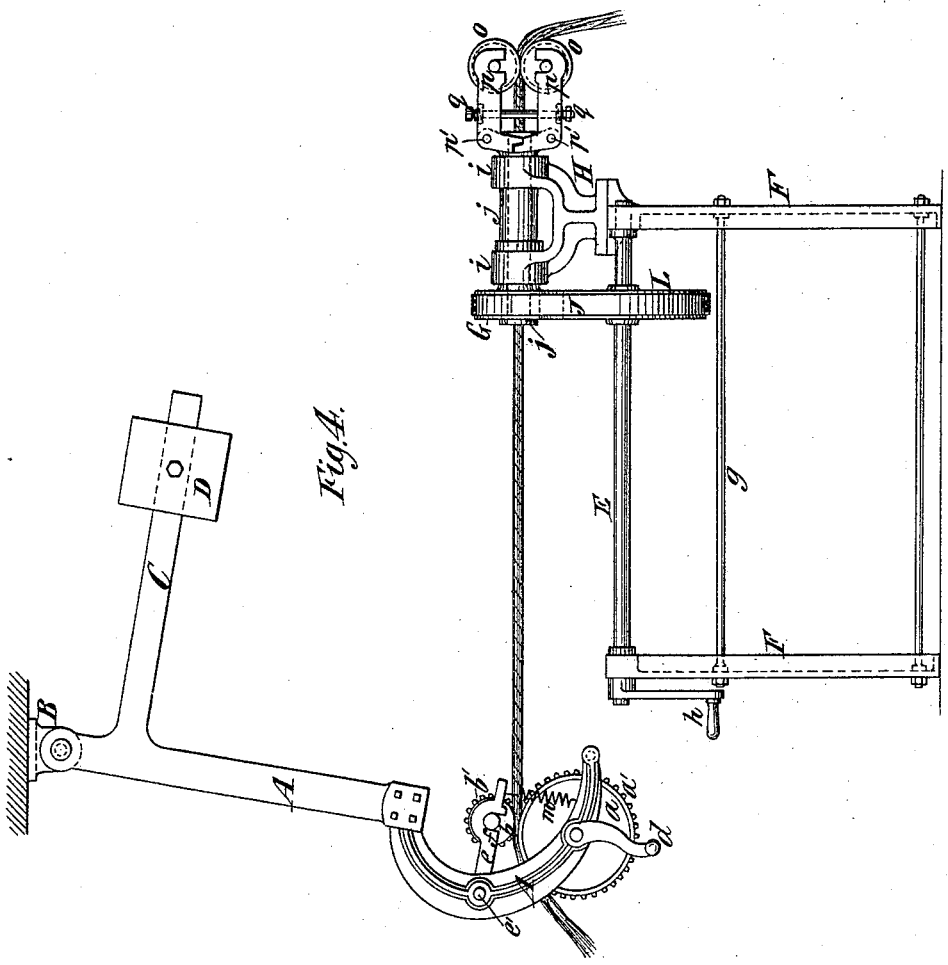

Fig. 4.

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UNITED STATES PATENT OFFICE.

ISAAC E. PALMER, OF MIDDLETOWN, CONNECTICUT.

PROCESS OF STARCH-CLEARING, &c., WOVEN FABRICS.

SPECIFICATION forming part of Letters Patent No. 346,602, dated August 3, 1886.

Application filed October 22, 1883. Serial No. 109,653. (No model.)

To all whom it may concern:

Be it known that I, ISAAC E. PALMER, of Middletown, in the county of Middlesex and State of Connecticut, have invented certain new and useful Improvements in the Process of Starch-Clearing, Milling or Mulling, and Elastic-Finishing Woven Fabrics; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

The finishing processes known as "starch-clearing," "milling," "mulling," and "elastic-finishing" woven fabrics consists in certain manipulations to which the fabrics, after having been starched and while moist or not quite dry, are subjected to work or clear out the starch from the meshes or interstices between the warp and weft, and from between the intersections of the warp and weft fibers.

What are known as "starch-clearing," "milling," and "mulling" have until recently commonly been performed by working the fabrics with the hands; but what is known as "elastic-finishing" has commonly been produced in the tentering and drying machine by giving the fabric vibratory motion while being tentered and dried; but on December 9, 1879, Letters Patent No. 222,527 were granted to me for improvements in the process of and machinery employed for starch-clearing and milling or mulling. The improvement in the process covered by these Letters Patent consisted in subjecting the fabric, in a piece of any length, starched and in a moist state, to a continuous twisting and untwisting operation, performed upon all parts of its length in regular succession, and continuously from end to end, the fabric being moved or fed longitudinally through the machine at the same time that it is being twisted and untwisted.

The improvement in the process of starch-clearing, milling or mulling, and elastic-finishing woven and starched fabrics in the piece, which is the subject of my present application, consists in holding or grasping the starched fabric at intervals in its length, in then subjecting the portion of the fabric between the holding-points to a twisting and untwisting operation while the fabric has no lengthwise feed, and in feeding the fabric lengthwise after each twisting and untwisting operation, in order to bring successive portions thereof into position to be held and twisted and untwisted. The fabric may be subjected to this process in a single or doubled state, and the process also consists in doubling the starched fabric and grasping or holding it at intervals in its length and in such doubled state, in subjecting the portion of doubled fabric between the holding-points to a twisting and untwisting operation while the fabric has no lengthwise feed, and in feeding the fabric lengthwise after each twisting and untwisting operation to bring successive portions of the fabric into position to be held.

In the drawings, Figure 1 is a front elevation of a machine for carrying out my invention and adapted to twist and untwist a doubled portion of a fabric. Fig. 2 is a side elevation thereof. Fig. 3 is a plan of the principal portions of the same, and Fig. 4 is a view similar to Fig. 1 of a machine for operating on single portions of the fabric.

Similar letters of reference indicate corresponding parts in the several views.

Referring first to Figs. 1, 2, and 3, A designates a swinging frame suspended from the hanger B, which may be secured to the floor-joists or other convenient part of a building. The frame is provided with arms C, upon which weights D are mounted, and capable of adjustment for the purpose of moving the said frame in the direction of the arrow. (Shown in Fig. 1.) The lower part of this frame A carries the three parallel rollers *a*, *b*, and *c*, to which motion is given by the hand-crank *d* on the shaft of the lowest roller, *a*, and through the gear-wheels *a' b' c'*, by which the several rollers are geared together to rotate with the same surface-velocity. The shaft of the lowest roller is in bearings in the frame A; but those of the rollers *b* and *c* are in bearings *f f* in the under side of yokes *e e*, which are pivoted at *e' e'* onto the frame A.

To the inner ends of the yokes *e e* are attached springs *m*, which are fastened to the frame A, and which serve to exert pressure on the rolls, that they may give motion to or hold the fabric which is between them.

E is a horizontal shaft working in bearings in a frame consisting of two side pieces, F F,

united by braces *g g*. On this shaft E, to which motion is given by the hand-crank *h*, there is a pulley, L.

Securely attached to the frame F *g* is the standard H, containing bearings *i i*, in which works the spindle *j*. In the head K of this spindle *j* is a sheave, *n*, and in one of its cheeks is an opening, *l*, to permit the fabric to be doubled and twisted to be easily slipped onto the sheave *n*.

G is a pulley firmly secured on the spindle *j*, and receiving motion by means of the belt J from the pulley L.

The piece of goods to be treated according to my improved process, being starched, and in a moist state, is first introduced between the rolls *b* and *c* and drawn forward by turning the handle *d* until sufficient is passed to bend round the sheave *n* of the spindle *j* and to be brought back and passed between the rolls *a* and *b*, being thus doubled between two points at which it is held—viz., one point between the rolls *b c* and another between the rolls *a b*. Rotary motion is now given to the handle *h* in either direction, causing the spindle *j* and its sheave *n* to rotate and twist the doubled fabric while it is held at the two points mentioned and kept at a tension by the weights D on the swinging frame. After having twisted the fabric tightly in one direction the rotary motion is reversed, and the fabric is thereby untwisted, and may be afterward twisted in the opposite direction to that first mentioned. The fabric may be repeatedly twisted and untwisted in either or both directions; but the operation of the spindle *j* is always stopped at a point where there is no twist in the doubled portion of the fabric. By this twisting and untwisting of the fabric the starch or dressing in the meshes or interstices between the warp and weft yarns is worked out therefrom and worked into the fibers, so as to leave the threads starched without any adhesion to each other, producing an elastic finish to the material so treated. After the portion of the length of the fabric so doubled between the two points at which it is held has been operated on in the manner described, and while no part of the said doubled portion remains twisted together, it is delivered through the rolls *a b* by turning the hand-crank *d*. As the three rolls *a*, *b*, and *c* are geared together and have the same surface-velocity, there will, simultaneously with the delivery of the portion treated, be received through the rolls *b c* a fresh portion of the fabric, which will be drawn round the sheave *n*, and be held and operated on similar to that portion preceding it, and in this way successive portions of the fabric are received and operated on at a time until its entire length has been subjected to the described treatment.

The fabric, according to its character or the quality of the finish to be given to it, may be subjected to the operation of the machine while moist with the application of starch, or while moistened by the application of water, steam, or spray, after having been starched and dried; or in some instances it might be passed through the machine in a dry state.

The machine shown in Fig. 4 differs but little from that before described. The twisting-spindle *j*, instead of being provided with the head open at one side and containing a sheave, is made hollow and carries at its rear end a pair of rolls, *o*, which are mounted in frames *p*, fulcrumed at *p'* to the spindle. These frames are capable of being drawn together by a bolt and nuts, *q*, or other means, to cause the rolls *o* to grip the fabric more or less tightly, the fabric being passed between the rolls and through the hollow spindle. The swinging frame A carries only a simple pair of feed-rolls, *a b*, geared together by wheels *a' b'*, and adapted to be rotated by a hand-crank, *d*, or otherwise.

In the operation of the machine last described the fabric is held by the rolls *o o* and *a b*, and the portion between the points of holding is twisted and untwisted, as before described. After each successive portion of the fabric is sufficiently twisted and untwisted the feed-rolls *a b* are operated by the hand-crank *d*, and a new portion of the fabric is brought into position to be twisted and untwisted.

By the term "doubled portion of the fabric," as herein used, I do not mean to confine myself to a single doubling, as the fabric might be doubled and the doubled portion again doubled one or more times before twisting.

According to the process set forth in my Letters Patent No. 222,527, hereinabove referred to, the entire operation is continuous, the fabric being twisted and untwisted at the same time that it is fed forward, and I have only lately discovered by experiment that the same kind of finish may be produced by holding the starched fabric at isolated points in its length and subjecting the portion of the fabric between the holding-points, and while it is destitute of lengthwise movement or feed, to a twisting and untwisting operation, and afterward feeding the fabric forward in order to bring different portions successively to a position to be held.

I am aware of United States Letters Patent No. 13,684, granted October 16, 1855, which show and describe a clothes-wringer having a hook, upon which the bight of a doubled fabric may be placed, and a rotary clamp, by which the opposite end of the doubled fabric may be held, and which may be turned to twist the fabric. This patent describes no process of treating fabrics after starching for the purpose of starch-clearing, milling or mulling, and elastic-finishing, and the machine therein shown is only intended for drying clothes after washing and before starching.

I do not desire to cover, broadly, the operations or steps herein described for any purpose, but only seek to cover a process of starch-clearing, milling or mulling, and elastic-finishing starched fabrics, which includes said steps.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The improvement in the process of starch-clearing, milling or mulling, and elastic-finishing starched fabrics, consisting in holding the starched fabric at intervals in its length, in then subjecting the portion of the fabric between the holding-points to a twisting and untwisting operation while the fabric has no lengthwise feed, and in feeding the fabric lengthwise after each twisting and untwisting operation, in order to bring successive portions thereof into position to be held and twisted and untwisted, substantially as herein described.

2. The improvement in the process of starch-clearing, milling or mulling, and elastic-finishing starched fabrics, consisting in doubling the fabric and holding it at intervals in its length in such doubled state, in subjecting the doubled fabric between the holding-points to a twisting and untwisting operation while the fabric has no lengthwise feed, and in feeding the fabric lengthwise after each twisting and untwisting operation to bring successive portions of the fabric into position to be held, substantially as herein described.

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Witnesses:
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ED. L. MORAN.