2 Sheets--Sheet 1.

W. BIRCH.

Machines for Opening, Smoothing, and Guiding Fabrics.

No. 137,169. Patented March 25, 1873.

Fig. 1

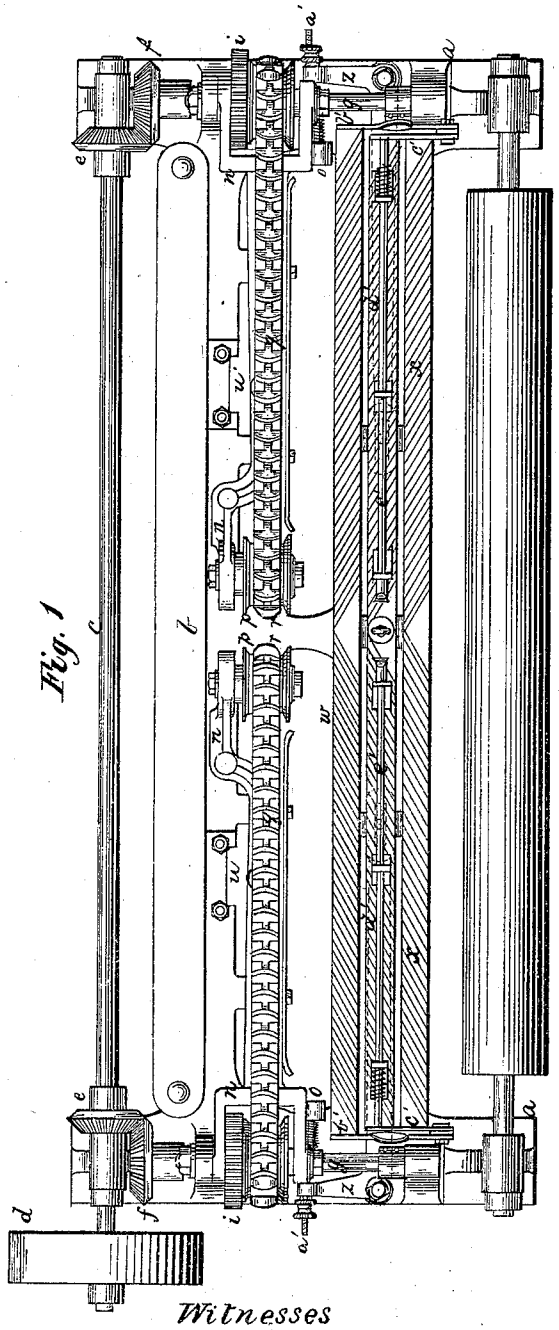
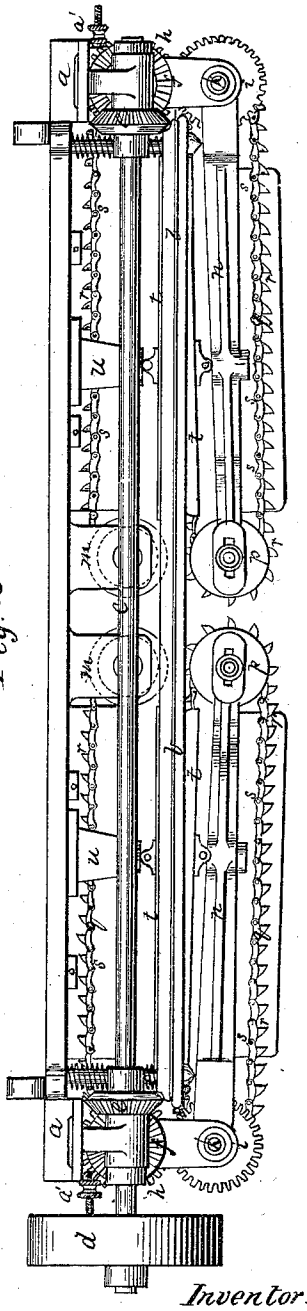


Fig. 2



Witnesses

Charles Wm Collins

Charles Alfred Marriott

Inventor.

William Birch

2 Sheets--Sheet 2.

W. BIRCH.

Machines for Opening, Smoothing, and Guiding Fabrics.

No. 137,169. Patented March 25, 1873.

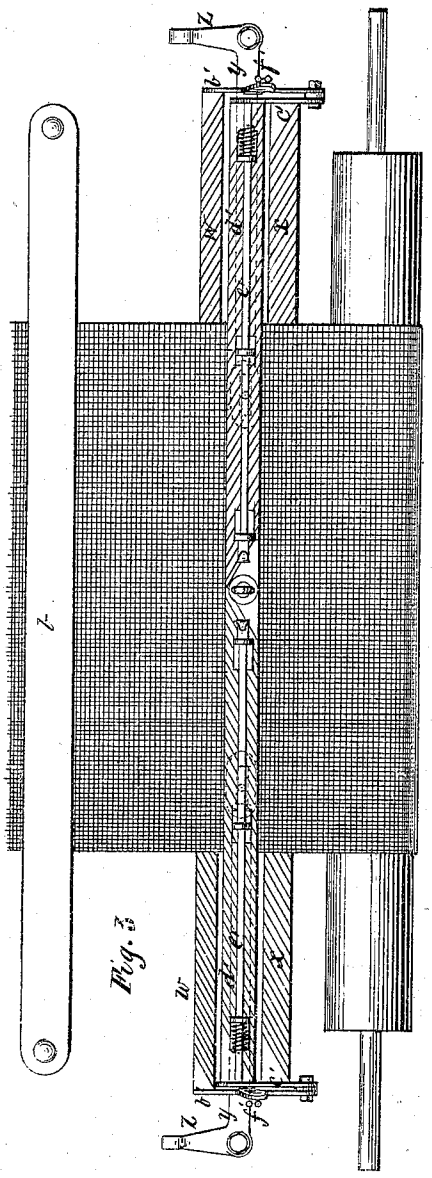


Fig. 3

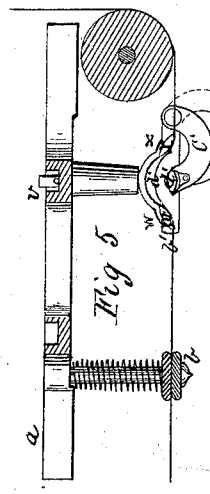


Fig. 5

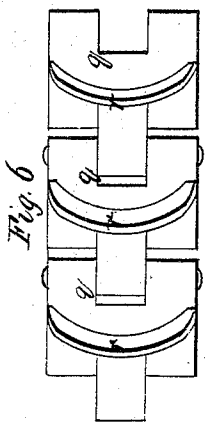


Fig. 6

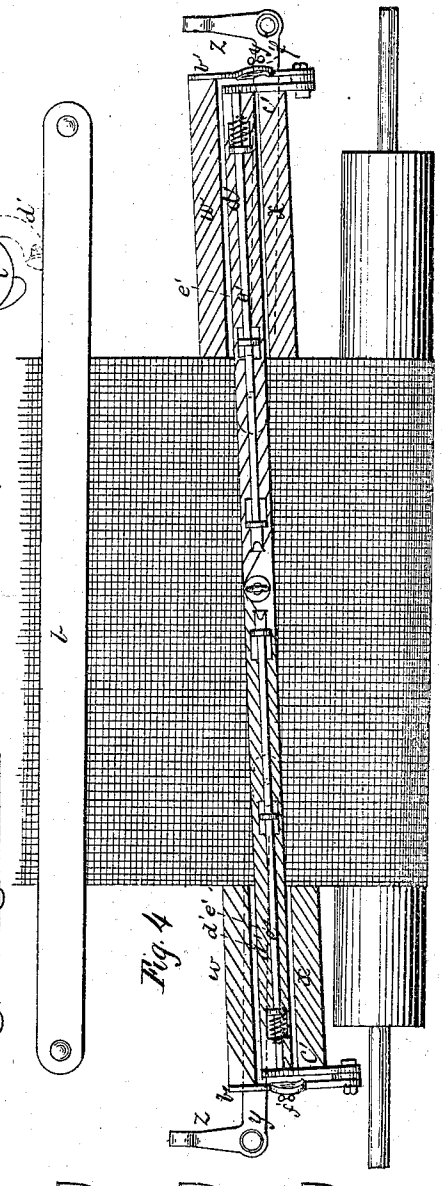


Fig. 4

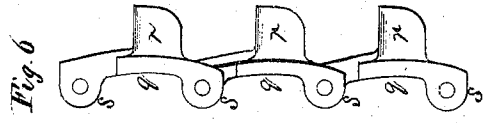


Fig. 6

Witnesses.

Charles Wm Collins

Charles Alfred Marriott

Inventor.

William Birch

UNITED STATES PATENT OFFICE.

WILLIAM BIRCH, OF MANCHESTER, ENGLAND.

IMPROVEMENT IN MACHINES FOR OPENING, SMOOTHING, AND GUIDING FABRICS.

Specification forming part of Letters Patent No. **137,169**, dated March 25, 1873.

To all whom it may concern:

Be it known that I, WILLIAM BIRCH, of Manchester, in the county of Lancaster and Kingdom of England, have invented new and useful improved self-acting machinery for opening, smoothing, spreading, and guiding calico, cloth, and other fabrics, for the use of bleachers, dyers, calico-printers, and others; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying two sheets of drawing and to the letters of reference marked thereon.

One object of this invention is to perform by machinery the operations of opening, smoothing or spreading, and guiding calico, cloth, or other fabrics to drying and other machines, which operations are usually performed by the manipulation of the hands and fingers of work-people. For this purpose I pass the calico, or cloth, or fabric between guide-bars, and between two pairs of endless bands or chains traveling horizontally on pulleys or chain-wheels having revolving motion imparted to them by gearing from a revolving shaft of the machine, and the studs or bearings for the pulleys or wheels for one band or chain at each side are stationary, and those for the other band or chain at each side placed on movable arms worked by levers, and the parts of the bands or chains in contact with the cloth or fabric travel outward from the center of the machine. The endless bands or chains are either plain or have projections or serrated surfaces fixed to them, the projections or teeth on one of each pair of bands or chains passing between those on the other, in order to give a gripe to the cloth or fabric; and when the projections or teeth are not required the friction of the plain or serrated surfaces will be sufficient to keep the fabric opened out. Below or above in line with the endless bands or chains, there is a two-armed lever having at each side two or more corrugated bars, the angles on one side being reversed to those on the other, and the central shaft or fulcrum of the lever is connected by an arm to cranks attached to the levers on the movable arms, and between the corrugated bars, at each side, there is a corrugated or plain bar, which can be adjusted to any required pressure by screws, and the two-armed lever with its corrugations and spring-bars is used as a regulator or governor to maintain the calico, cloth, or fabric central with the machine.

At the commencement of operations, when the machine is set in operation, an end of the calico, cloth, or fabric to be opened, spread, and guided is passed between the endless bands or chains and the corrugated bars, and then the cloth or fabric is drawn onward and as it advances it is opened and spread out by the endless bands or chains; and as long as it continues central with the machine no change takes place, but directly it commences to swerve on either side the regulator or governor is called into action.

When the cloth or fabric goes out of the center it passes further between the corrugated bars on one side of the two-armed lever and gives it motion, and also the levers connected with it, the effect of which is that the movable arm on the side of the machine where the fabric is out of the center is moved outward to lessen the effect of the traveling bands or chains on the cloth or fabric on that side, and the movable arm on the other side is moved inward to cause the bands or chains on that side to have a greater hold on the cloth or fabric, and cause it to become again central; and this regulator or governor is continually detecting the slightest swerving movement, and immediately giving motion to the movable arms as required.

On the accompanying two sheets of drawing, Figure 1, Sheet 1, is a front elevation, and Fig. 2 a plan, of one arrangement of my improved machinery; and Figs. 3, 4, 5, 6, and 7, Sheet 2, are detached views of some of the parts.

The side frames *a* are bolted to beams or a frame-work at any required part of the building, and the fabric to be smoothed and guided is drawn through the machine by its being connected to the drying, folding, printing, or other machine to which it is required to go. In bearings at the top of the frames *a* there is a shaft, *c*, carrying a pulley, *d*, and bevel-wheels *e*, which gear into other bevel-wheels,

f, on shafts *g*, to which are fixed spur-wheels *h*, gearing into spur-wheels *i* on stationary studs *k*. To the spur-wheels are cast or fixed chain-wheels, and on studs at the back there are wheels *m*, and on cranked levers *n o* chain-wheels *p*, the levers working on the stationary studs *k*. On the several pairs of chain-wheels there are two pairs of endless chains, *q*, Figs. 1, 2, 6, and 7, having external projections *r* and internal projections *s*, the latter gearing with the chain-wheels, and between these endless chains the fabric to be acted upon is passed; and in order to obtain sufficient gripe the external projections on one of each pair of chains pass between those on the other; and to prevent the chains from bulging inward there are plates *t*, one plate at each side being connected to the arm *n*, and the other plate at each side to a bracket, *u*, connected to one of the cross-frames. Near the endless chains there is a two-armed lever having a stud working in a bearing on the cross-frame, and at each side the lever is formed in the shape of two corrugated bars, *w x*, the angles of the corrugations on one side being the reverse to those on the other; and to the lever is pivoted two two-armed levers, *y z*, working on studs, the arms *z* being connected, as at *a'*, to the downwardly-projecting arms *o* of the cranked levers *n* which carry the chain-wheels. To plates *b'* at the ends of the corrugated bars *w x* are jointed arms *c'*, carrying a corrugated bar, *d'*, and two spring-bolts, *e'*, the ends of which bolts can enter slots in the plates *b'*, and the position of the central corrugated bar in relation to the two others is determined by thumb-nuts *f'* and screws in loose plates, and the two-armed lever with its corrugated bars is used as a regulator or governor to maintain the fabric central with the machine.

When the fabric has to be opened, spread, and guided, it is passed between the guide-bars *b*, the endless chains *q*, and the single and double corrugated bars to the machine required, the central corrugated bar having been turned back, as shown by the dotted lines, Fig. 5, to allow the passage of the fabric, the bolts being withdrawn from the slots for the purpose; but, when the connections are complete, the central bar is turned in, and afterward held by the spring-bolts *e'*. When the driving-shaft *c* is set in motion, revolving motion is given to the gearing, and horizontal traveling motions to the endless chains from the center to the outside, where they are in contact with the fabric; and these outward motions of the chains open and spread out the fabric, which is drawn by the machine to which it is connected; and as long as the fabric continues central with the machine no change takes place, but directly it commences to swerve on either side the regulator or governor is called into action. When the fabric goes out of the center at either side it passes further between the corrugated bars, as shown in Fig. 4, to a greater distance from the fulcrum *v*, Fig. 5, and thus sufficient leverage is obtained to change the position of the two-armed lever of the levers *y z*, and of the levers *n o*, as shown in Fig 4, the effect of which is, that the arm *n* on the side where there is more leverage and the wheel pivoted on it are moved outward to reduce the friction, and thereby lessen the effect of the traveling chains on that side, and the arm *n* and wheel on the other side move inward to cause the chains on that side to have a greater hold on the fabric and cause it to become again central; and this regulator or governor not only detects the swerving movement of the fabric from the center to the outside, but immediately gives motion to the levers, chain-wheels, and endless chains, as required.

The endless chains perform the operation of untwisting and spreading out or smoothing the fabric; but it is the action of the regulator or governor which guides or keeps it sufficiently central with the machine for the operations to be performed without the use of the hands or fingers of work-people, except in some extreme cases, in which the fabric is twisted in excess.

It will be seen that the regulator or governor is one of the main features of the invention, for it has to detect the swerving movement of the fabric, and at the same time, when the opposing powers are not too strong, to shift the parts in such a manner that the fabric can be safely guided at or near the center, and thus enable the operations of opening and smoothing or spreading to go on continuously.

The arrangement of the regulator or governor may be modified in various ways, for, instead of one two-armed lever on one fulcrum, I may employ two separate levers connected by levers and rods to the levers which carry the chain-wheels; and, when required, according to the delicacy of the fabric, the corrugations are dispensed with, and the friction obtained by India rubber or other elastic or non-elastic substances.

Instead of the endless chains, endless bands with internal and external projections may be employed, and, in some cases, the number of the endless chains or bands on each side are increased. In other cases I employ o band or chain at each side in connection with a stationary surface or roller, or in connection with ordinary stationary or revolving stretching bars or screws; and in these and similar machines my improved regulator may be advantageously employed to give more or less friction, and also to act as a guide.

Having now described the nature and particulars of my said invention, I desire it to be

understood that, in machinery for opening, smoothing or spreading, and guiding calico, cloth, and other fabrics to the machines used by bleachers, dyers, calico-printers, and others, I claim—

The combination of the two pair of endless chains *q*, both pair running from the center outward, the two pair of bars *w x*, the two two-armed levers *y z*, the plates *b'*, the jointed arms *c'*, and corrugated bar *d'*, all constructed and operating together substantially as described.

WILLIAM BIRCH.

Witnesses:

CHARLES WM. COLLINS,

CHARLES ALFRED MARRIOTT.