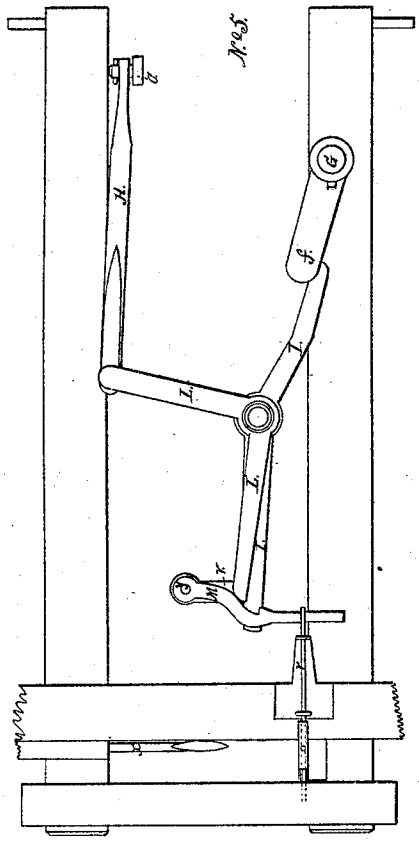
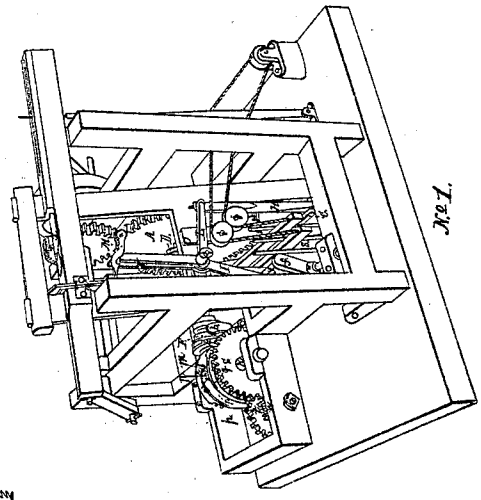
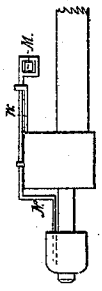
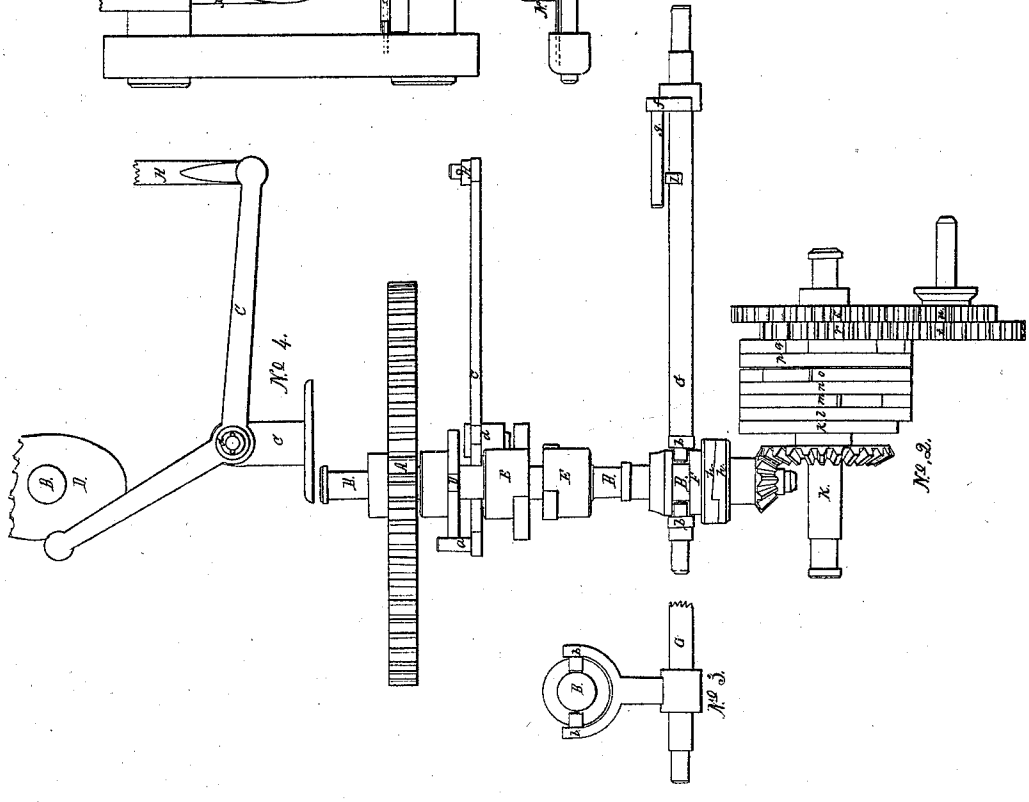
R. J. Stafford.
Hair Cloth Loom.

No. 19,719. Patented Mar. 23, 1858.









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

UNITED STATES PATENT OFFICE.

RUFUS J. STAFFORD, OF SMITHFIELD, RHODE ISLAND.

IMPROVEMENT IN STOP-MOTIONS FOR HAIR-CLOTH LOOMS.

Specification forming part of Letters Patent No. **19,719**, dated March 23, 1858.

To all whom it may concern:

Be it known that I, RUFUS J. STAFFORD, of Smithfield, in the county of Providence and State of Rhode Island, have invented certain new and useful improvements in looms for weaving hair-cloth or other fabrics where the filling is not supplied continuously from a flying shuttle, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Number 1 is an elevation of a hair-cloth loom with my improvements attached. No. 2 is a view of the connection between the gear that operates the heddles and the principal shaft in the loom; No. 3, a lever which operates the clutch; No. 4, a cam on the main shaft operating a bell-crank; No. 5, a view of the means by which the motion of the cam may be communicated to the rock-shaft upon which is the clutch-lever, and No. 6 is a side view of a "signal-messenger" with its guide-frame used in my improvement, a front view of the same appearing in No. 5.

The same letters indicate like parts in all the figures.

The nature of my invention consists in providing a means by which the action of the several sets of heddles employed shall be stopped before the shed is changed whenever the hair or other material used in the weft is not drawn between the warps where such weft was designed to have been placed, while at the same time the beat of the lay is not interrupted, and also in providing a means by which the said heddles shall automatically resume their actions the instant that such weft is properly inserted.

In that class of power-looms to which my improvement is more particularly applicable each hair of the filling is by the operator separately supplied to a hook which is connected to the wag-staff and thereby made to traverse the distance between the threads of warp. The operator holds the hair by one end while the hook trails it through and then the lay beats it up. In weaving hair-cloth, for instance, five heddle-frames are employed for the body of the cloth, besides the two heddle-frames for the selvage, and as these operate in alternate pairs, so as to produce a twilled surface on the cloth, the same shed is opened only at every fifth beat of the lay. Obviously the greatest degree of dexterity is required of the operator of a power-loom to supply to the hook at each beat of the lay the hair for the filling, and the most unremitting attention to the work is indispensable to prevent the injury to the appearance of the surface of the cloth by an omission to insert a hair between each shed. With all the skill and care that can be exercised it often happens that the hook fails to seize and trail after it the hair which has been presented to it, in which case the consequence is that the operator must wait until after the fifth beat of the lay ensuing before the same shed will be opened again, and a mistake in counting the right number of beats and then inserting the hair would be registered upon the surface of the cloth, while the necessity of waiting for five beats causes a sleazy streak in the fabric.

In the accompanying drawings, No. 1, a forward and backward motion is communicated to the lay-frame by the driving-pulley in the ordinary way, and by toothed gears motion is transmitted from the driving-pulley shaft to shaft B, No. 2, which revolves once to every two revolutions of the pulley. Shaft B is connected with the gear which operates the sets of heddles by the clutch *h h*.

I have represented in the drawings the kind of gear for giving motion to the sets of heddles patented by R. W. Andrews January 18, 1853, (the several heddles not being represented in the drawings to avoid confusion,) though it is evident that my improvement can be readily applied to looms provided with other contrivances for working the sets of heddles. The clutch-coupling *h h* is capable of being operated by the application of force to the arm *f*, Nos. 1 and 5, keyed upon the rock-shaft G, Nos. 2, 3, and 5, the clutch being in connection with the rock-shaft G, as represented in No. 3, while a weight or spring located in any convenient place, as at *v*, No. 1, keeps the clutch closed.

On the main shaft B of the loom is keyed a cam D, No. 4, of such a form as to give through the bent lever C an alternating motion to the upper end of the bell-crank lever L, No. 5, in a line parallel or nearly so with the axis of the main shaft B, No. 2, at every beat of the lay.

On the same fulcrum-pin with the bell-crank lever L, Nos. 1 and 5, is placed the

bent lever 1 1. The lower end of lever 1 1 bears against a wrist-pin in the rock-shaft arm *f*, and its upper end is furnished with a catch-link M, pivoted on a projection at *y*. The handle of the catch-link projects far enough to be inserted and play easily in the hand M of the signal-messenger No. 6, as represented in No. 5. The under side of the catch-link is curved inward, so that the lever L in its backward movement (coincident or nearly so with the backward beat of the lay) bearing against the curved side of the link raises the catch and with it the signal-messenger *w*, and sustains both in that position until after the hook *x* has presented itself for a hair and commenced its retreat. If the hair or other filling has been trailed into the shed by the hook, the signal-messenger in its descent (the lay now beating forward) will by means of the cross-wire Z, No. 6, be arrested by the hair and be supported by it, and consequently the catch of the link M will be held beyond the range of motion of the lever L. All the members of the loom are thus permitted to operate. If, however, the hair is not trailed in by the hook *x*, the signal-messenger descends so far as to drop the catch of the link M within the arc of vibration of the end of lever L, when levers L and 1 1 being thereby connected the motion of L is imparted through the rock-shaft G, No. 2, to the arm *b b*, No. 3, and the heddle-gear disconnected from the main shaft of the loom before the lay has beat up against the cloth or the shed changed. The beat of the lay is not, however, interrupted, and whenever the hook trails in the hair between the threads of the warp the action of the several sets of heddles recommences.

It should be observed that it is not desirable in this class of looms to have the whole machine stop, as that would not only involve the necessity of manual action on the part of the attendant to put it in motion again, but a much greater disadvantage would be the result from the fact that the operator would be obliged to back the loom far enough to throw the hook beyond the selvage in order to hook on the hair before starting the machine.

It is obvious that the principle above described can be successfully and with advantage applied to any description of loom of this class employing several sets of heddles, though the form, position, and operation of the several parts to effect the result may be greatly varied—as, for instance, the sets of heddles may be operated by cams working treadles, in which case the cam-shaft should be distinct from the main shaft and capable of being connected with it, and the form and arrangement of the several parts of my improvement should be adapted to meet such change. Again, revolving gears connected with the main shaft or other revolving part of the loom may be substituted in place of lever L, one of which could be furnished with pinions in its face at such distances as to act upon the disconnecting-lever when brought in contact with any one of them. The plan, however, which I have exhibited in the drawings I consider the best and simplest, and therefore I have described it minutely. I also contemplate the application of this principle to hair-cloth looms having a jacquard attached to control the movements of the sets of heddles for weaving figured hair-cloth, so that the failure to insert a single hair of the filling will disconnect by substantially the same means as those above described the jacquard from the other parts of the loom, and thereby stop the heddles and leave the right shed open until the hair is properly inserted. I have also successfully made lever 1, at the same time that it was called into action to open the clutch, raise the pawl that usually works the "take-up" beam clear of the ratchet during the forward beat of the lay, and thus while the heddles were stopped prevent the cloth from being wound upon the beam. It is also apparent that the mechanical contrivances or their equivalents by which the action of the sets of heddles is arrested can also be made to operate upon the lever which controls the driving-pulley belt, and thus stop the motion of the loom before the lay has beat up against the fabric and the shed changed.

I wish it to be understood that I do not limit myself to the special construction or arrangement of parts as described, but I claim all merely formal variations performing the same mode of operation by equivalent means.

What I do claim as my invention is—

1. The mode of operation, substantially as specified, by means of which, in case the hook, nippers, or other instrument used to insert the weft of the cloth fails to seize and draw in any one hair or other material intended, a disconnection is, in consequence, effected between the gear that controls the action of the several sets of heddles and the source of motion before the relative positions of the several sets of heddles to each other are shifted and a new shed opened, while the other parts of the loom are permitted to continue in operation, as herein set forth.

2. The mode of operation, substantially as specified, by means of which the signal-messenger No. 6, during the backward beat of the lay, is returned to such a position that whenever the hair or other material is inserted between the threads of the warp where it belongs the gear which controls the action of the several sets of heddles is again put in motion, as set forth.

3. The signal-messenger No. 6, constructed, applied, and operated in the manner and for the purpose substantially as described.

RUFUS J. STAFFORD.

Witnesses:

JAMES M. RIPLEY,

WM. H. GREEN.