C. HALE.

Sewing Machine.

No. 50,117. Patented Sept. 26, 1865.

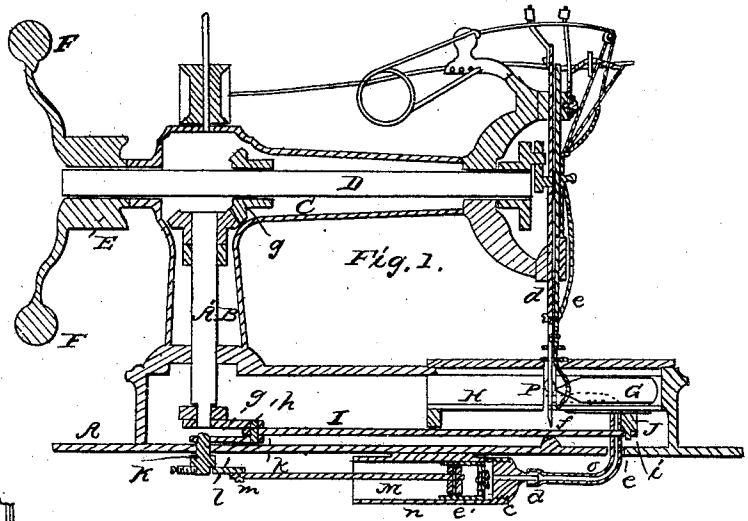

Fig. 1.

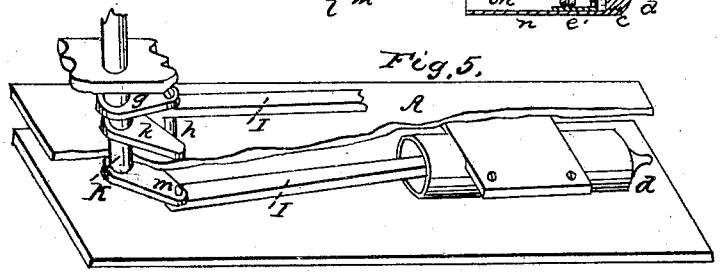

Fig. 5.

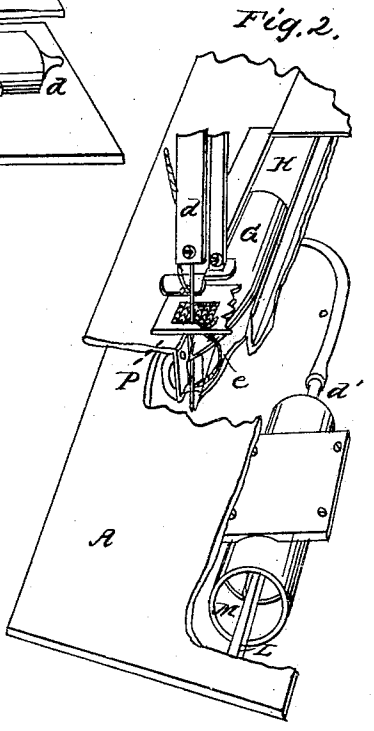

Fig. 2.

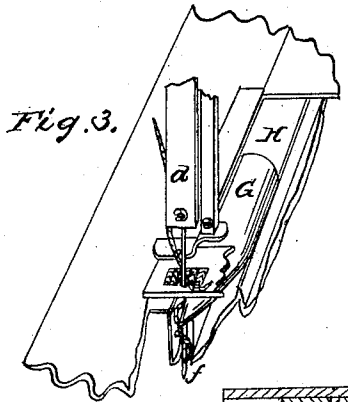

Fig. 3.

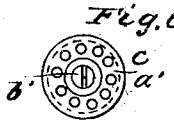

Fig. 6.

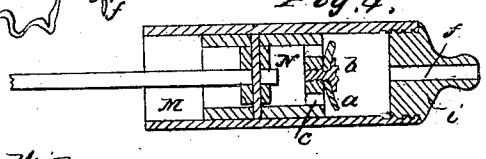

Fig. 4.

Witnesses:
A. L. Simpson
J. W. Porter

Inventor:
Charley Hale

UNITED STATES PATENT OFFICE.

CHARLES HALE, OF BANGOR, MAINE.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **50,117**, dated September 26, 1865.

To all whom it may concern:

Be it known that I, CHARLES HALE, of Bangor, in the county of Penobscot and State of Maine, have invented a new and Improved Mode of Preventing Sewing-Machines from Missing Stitches; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, in which—

Figure 1 is a longitudinal vertical section of my improvement attached to a sewing-machine, also shown in section. Fig. 2 is a detached perspective view showing the operation of my improvement at the moment of forming the loop, or when the shuttle enters the loop. Fig. 3 is a detached perspective view, showing a misstitch and its cause. Fig. 4 is a longitudinal section of the air-pump. Fig. 5 is a detached perspective view showing the manner in which motive power is imparted to the air-pump from the sewing-machine; and Fig. 6 is an end view of the air-pump piston.

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

The nature of my invention consists in providing sewing-machines with an air-pump or other suitable mechanism by which a current of air is created, and by means of a tube or other conduit is conveyed to an orifice near the needle, and thence thrown upon that portion of the thread which forms the loop, deflecting it from the face of the shuttle-race (or needle) and beyond the line traversed by the point of the shuttle, thereby insuring the proper development of the loop, and preventing the slack thread which forms the loop from bending or kinking in the wrong direction and thus causing a misstitch.

A represents the table or bed-plate of the sewing-machine. B is the standard. C is the arm through which passes the main shaft D. E is the pulley by which motion is imparted to the machine by means of a belt. F is the balance-wheel. G is the shuttle. H is the face of the shuttle-race. *e* is the needle-thread. *d* is the needle-bar. *c* is a cam fixed on the needle-bar. *a* is a disk fixed on the end of shaft D. *b* is a pin which is fixed in a disk, *a*, and projects from its face. I is the shuttle-pitman. J is the shuttle-driver. A′ is a vertical shaft. *g* is a crank fixed on the lower end of shaft A′. *h′* and *g* are bevel-pinions.

The shaft D, being revolved, imparts motion to needle-bar *d* by means of pin *b*, sliding in cam *c*. The shuttle receives its motion from its carrier J, which is driven by pitman I, connected with the carrier at *i*. The pitman is connected at *h* with crank *g*, which receives its motion from vertical shaft A′, which latter, by its pinion *h* meshing into pinion *g′* on shaft D, receives its motion from said shaft and communicates it to the shuttle, as described, and also to the air-pump, as is hereinafter described.

The sewing-machine, being well known, does not require a more particular description, some of the minor parts being omitted in the foregoing, it being intended only to show the principal movements connected with the improvement, especially as the latter is not in its nature confined to this or any other machine; but being equally adapted to every kind and class, its application is not intended to be confined in the claims to the machine in connection with which it is herein described and shown.

M is the air-pump, which is secured to the under side of table A. N is the piston. L is the pitman or connecting rod, connected with the piston by pin *n*. K is a short shaft or pin passing through table A. On the upper end of this shaft is fixed crank *k*, and on the lower end crank *l*. The pin *h*, which connects crank *g* with the shuttle-pitman, projects below the pitman a sufficient distance to bear against the edge of crank *k*, which is thereby carried round simultaneously with crank *g*; and crank *l* being connected with the pump-pitman at *m*, the necessary motion is thereby imparted to piston N. The piston is perforated with a series of apertures, *c′*, (shown in Figs. 1 and 6.) The valve *a′* (shown in Figs. 1 and 4, and by dotted lines in Fig. 6) is formed of leather or other suitable elastic material. It overlaps and covers the apertures *c′*, and is secured to the piston by screw-cap *b′*.

i′ is the pump-head, which may be formed with the pump or separately, and secured to it by male and female screws, as shown. It has an air-passage, *f′*, leading through its center, and is formed with a nipple to which is attached tube *o* at *a′*. The tube *o* passes up through table A at *e*, and thence, as shown in Fig. 2

and by dotted lines in Fig. 1, to the perforation behind the needle in the face of the shuttle-race.

The pump being in motion, during the backward movement of the piston N the air rushes through perforations c', springs the valve a' clear of the apertures, as shown in Fig. 4, thereby filling the increasing air-space between the piston and head *i*. In the forward movement of the piston the valve a' closes by force of the compressed air which is being driven through aperture f' into tube *o*.

In sewing with machines, whether single or double thread, after the needle has made its full descent all parts of the needle-thread are at full tension; but when the needle begins its ascent, that portion of the needle-thread which is between the cloth and the needle's eye begins to slacken, and should bend outward from the face of the race or from the needle, and at the moment when the slack of the thread is sufficient to allow the proper development of the loop the stitch is formed, the action of the machinery being adjusted to form the stitch at that point in the movement; but, owing to a variety of causes, among which are the frequent use of thread too small for the needle, or the kinky nature of silk and twist, the thread, instead of bending outward from the needle, as shown at *e*, Fig. 2, bends or kinks in the opposite direction, as shown at *e*, Fig. 3, whereby the loop is not formed and a misstitch ensues, thereby causing a serious defect, besides retarding the progress of the work. But by the use of my improvement a misstitch is rendered an impossibility, for the following reasons: The machine being put in motion by the means already explained, the air-pump, working as has been shown, forces a strong current of air through tube *o* and aperture P upon the thread *e*, Fig. 2, at the moment when the thread slackens for the purpose of forming the loop and stitch, by which means the slack thread is blown in a deflected line from the needle and face of the shuttle-race, thereby insuring the proper development of the loop and formation of the stitch, this being the result whether the machine used be a single or double thread machine, and whether a shuttle or any other device be used for the purpose of forming the stitch. The blast should be properly directed upon the thread, in order that it may not blow the loop in line with instead of out and away from the side of the race, or the line traversed by the device which forms the stitch. I use the pump M, as shown, for the purpose of throwing or forcing the blast of air upon the loop; and I so adjust the movements of the pump to the machine that the full force of the current of air is brought to bear upon the thread when the loop is being formed; but a variety of devices may be employed to produce the jet or blast of air, which devices may be operated directly by the machine or by any auxiliary or independent power, while the current of air may be poured continuously upon the thread, or it may be intermittent, as described above, and besides it may be thrown upon the thread either through a single aperture or a plurality of apertures, and in the latter case the perforations may be direct or converging, as may best accomplish the end in view.

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

1. The application to the needle-thread of sewing-machines of a current or blast of air which will deflect the thread in the right direction for the formation of the loop and stitch, as herein described and shown.

2. The combination of the air-pump M and tube *o*, substantially as and for the purpose specified.

CHARLES HALE.

Witnesses:

T. W. PORTER,

H. L. MITCHELL.