J. G. HOLLOWELL.

Sewing Machine.

No. 37,624. Patented Feb. 10, 1863.

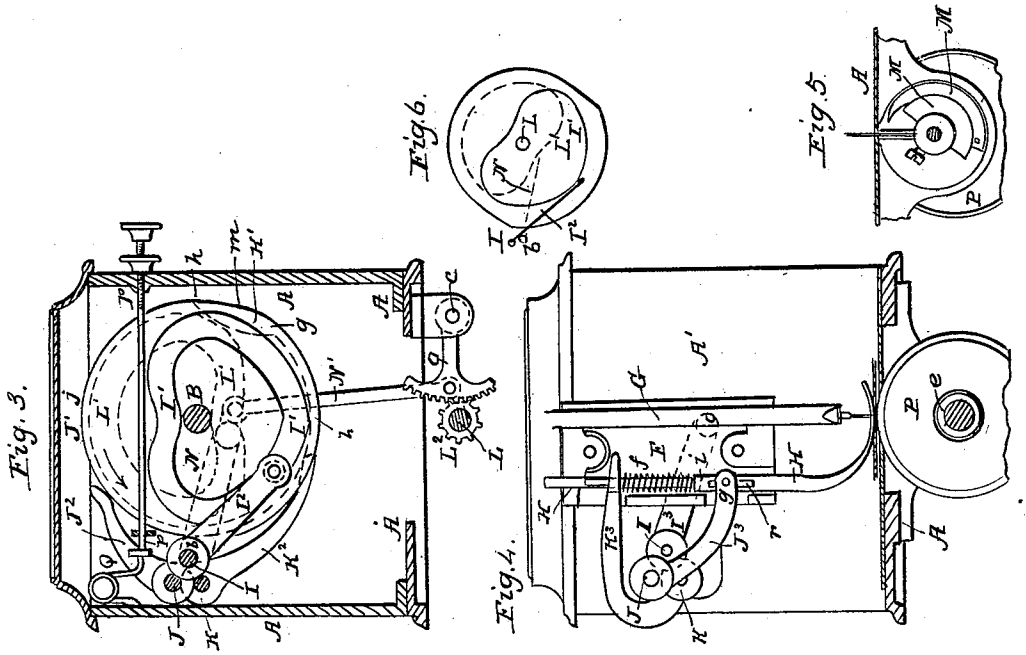

Fig. 3.

Fig. 6.

Fig. 5.

Fig. 4.

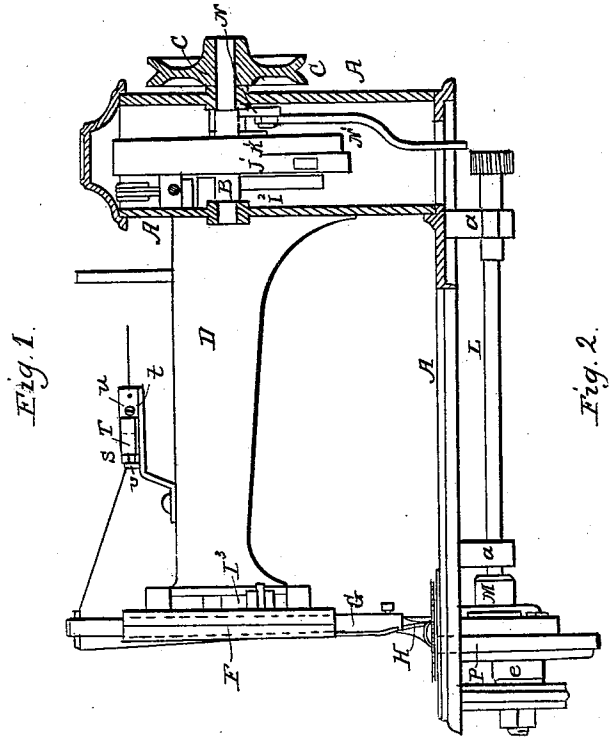

Fig. 1.

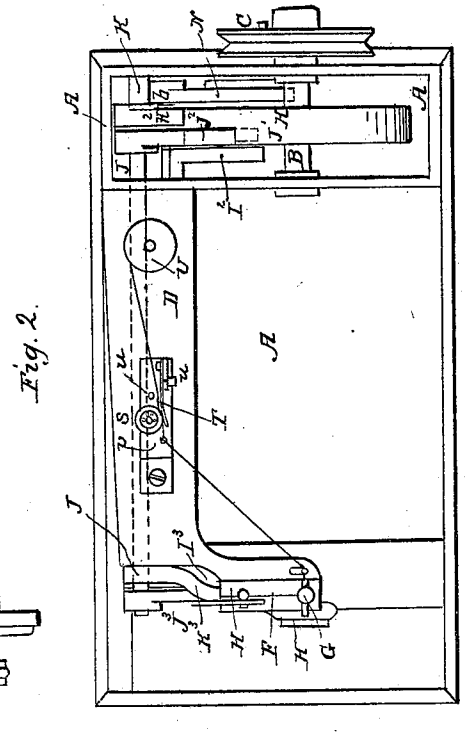

Fig. 2.

Witnesses.

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UNITED STATES PATENT OFFICE.

J. G. HOLLOWELL, OF CANANDAIGUA, NEW YORK.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **37,624**, dated February 10, 1863.

To all whom it may concern:

Be it known that I, J. G. HOLLOWELL, of Canandaigua, in the county of Ontario and State of New York, have invented certain new and useful Improvements in Sewing-Machines; 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, in which—

Figure 1 is a side view, partly in section, of a sewing-machine with my improvements. Fig. 2 is a top view of the same with the cover of the cam-box taken off. Fig. 3 is a transverse section of the box which contains the driving-cams of the machine. Fig. 4 is a left-hand end view of the machine with the covering-plate of the needle-bar and presser-guide removed. Fig. 5 is a side view of the oscillating shuttle-carrier and shuttle. Fig. 6 is a diagram of the needle and shuttle movements.

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

The principal object of my invention is to enable a sewing-machine to work equally well with its wheel or pulley rotating in either direction, by which means two important advantages are obtained—viz., first, the thread is not broken by accidentally turning the machine the wrong way, as it is in most or all of the machines at present in use; and, second, the direction of the sewing may be instantaneously reversed at any time by simply reversing the direction of the driving wheel or pulley; and the principal part of my invention consists in the arrangement of the needle and shuttle operating and feed-operating cams or their equivalents, and of the mechanism employed in connection with them to effect the above-mentioned result.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the bed-plate of the machine, having at its right-hand end an upright box, A′, in the sides of which are the bearings of the main shaft B, which carries the driving-pulley C and the cams from which the movements of the several parts of the machine are derived, and which also forms the support for the stationary arm D, which carries the fixed guide F, in which the needle-bar G and presser H work. This arm D is set back from the guide F, as shown in Figs. 2 and 4, to enable it to cover or receive within it the three rock-shafts I J K, by which the needle and feed motions are produced. Under the bed there are bearings *a a* for the rock-shaft L, to which is firmly secured the oscillating shuttle-carrier M′, in which the oscillating shuttle M is placed. The several rock-shafts are all parallel with each other and with the main shaft B.

The four cams I′, J′, K′, and L′, provided on the main shaft for operating the several rock-shafts I J K L, are all made of a single piece of metal. The needle-operating cam I′ and shuttle-operating cam L′ are grooved-face cams, and the cams J and K for operating the feed-motion are peripherical cams. The groove of the cam I′ differs only so much from what is known as a "heart-shaped" cam that in producing the upward movement of the needle by a rotary movement in either direction it first raises it a short distance, then keeps it stationary for a short time for the shuttle to pass, and afterward completes the upward movement in substantially the same manner as the cams which are constructed to operate in one direction only. The said cam acts upon an arm, I^2, secured to one end of the rock-shaft I, and another arm, I^3, secured to the other end of the said rock-shaft, is connected with the needle-bar G. The groove of the shuttle-operating cam L′ is nearly of the form of a portion of a circle larger than a semicircle, with the angles that would be formed between the arc and cord rounded off, the arc-formed portion being concentric with the shaft B, and this cam L′ acts upon a lever, N, which is arranged to oscillate from a fixed fulcrum, *b*, within the box A, and the said lever is connected by a rod, N′, with a toothed sector, O, which is arranged to oscillate upon a fixed stud, *c*, and to gear with a pinion, L^2, on the shaft L, and by these means the said cam L′ produces the necessary oscillating movement of the said shaft L to carry the shuttle back and forth the proper time relatively to the movement of the needle. The said cam L′ is so arranged relatively to the needle-operating cam I′ that in whichever direction the shaft B rotates the shuttle will commence its ad-

vance simultaneously with or immediately after the commencement of the rise of the needle, and as the two halves of each of the cams, formed by bisecting them through the two points which are in operation when the needle has completed its downstroke and the shuttle its back-stroke, as indicated by the line *d* in Fig. 6, are exactly alike, the relative movements of the needle and shuttle must be the same in whichever direction the said cams rotate.

Before describing the feeding-cams I will describe the kind of feed-motion I use.

The feeding device consists of the presser H, which is fitted to its guide F in such manner as to be capable of oscillation back and forth in the direction of the arrow shown on its foot in Figs. 2 and 4, and vice versa. The cloth is held between the presser-foot and the periphery of a wheel, P, which protrudes slightly through the upper surface of the bed A, the said wheel being arranged to be turned freely upon a fixed stud, *e*, below the bed by the friction of the cloth. The presser has applied to it the necessary pressure to make it take hold of the cloth and feed it, and to strip the cloth from the needle in the upward movement of the latter by means of a spiral spring, *f*, which is coiled round its stem between a shoulder, *i*, provided thereon and an arm, K^3, secured on the rock-shaft K; but this pressure must be removed during its return movement, or the cloth would be caused to return with it, and it is to produce and remove this pressure that the cam K′ is employed. The said cam has its periphery of circular form, concentric with the shaft B except at *g h*, where there is a recess or depression in it. The said cam acts upon an arm, K^2, secured on the rock-shaft K, and at all times but while the recess *g h* is passing the bearing-point of said arm it keeps the said arm pressed downward, and so keeps the arm K^3 pressed downward upon the spring *f*, which gives the presser a yielding or elastic pressure; but while the recess *g h* is passing the arm K^2, which is always while the foot is moving back, the cam does not press upon the said arm, and no pressure is produced on the spring *f*, which is left loose between the shoulder *i* and arm G, and the presser is simply kept upon the cloth by its own weight, which is not sufficient to make it return the cloth. The cam J′, by which, with the aid of a spring, Q, the backward-and-forward movement of the presser is produced, is composed of an arc, *j*, of smaller radius but more than half a circle, and an arc, *k*, of greater radius but less than half a circle, united by two very gradual slopes, *l* and *m*. The arm J^2 of the rock-shaft J is pressed toward this cam by means of a strong spring, Q, as far as permitted by the adjusting-screw *p*, which regulates the length of feed, and a second arm, J^3, of the said rock-shaft is connected with the stem of the presser by means of a pin, *q*, secured firmly in the said arm and working in a longitudinal slot, *r*, in the said stem, the said arm J^3 being set at such an angle that the upward-and-downward movement of the pin in the slot produces the backward-and-forward movement of the presser.

When the shaft B and cams rotate in the direction of the arrow shown upon the latter in Figs. 3 and 4 the feed is produced by the action of the slope *m* of the cam on the arm J^2 of the rock-shaft, and is in the direction of the arrow shown on the presser-foot in Figs. 2 and 3, and the return movement of the presser is produced by the spring Q while the slope *l* is passing the arm J^2; but when the shaft B and cams rotate in the opposite direction the feed is produced in the opposite direction by the action of the spring Q while the slope *m* is passing the arm J, and the return movement of the presser is produced by the action of the slope *l* upon the arm J^2. The change in the action of the presser by which it is made to feed in one direction or the other, according to the direction of the rotation of the main shaft B, is produced by the arrangement of the pressure-cam K in such relation to the feeding-cam J as always to relieve the presser of the pressure of the spring *f* at the time the slope *l* of the cam is passing, but to keep the pressure on while the stop *m* is passing. It should be observed that the cam K should also be so constructed and arranged that during the time it relieves the presser from pressure the needle should be in the cloth and the cam J so arranged that the feed movement will be produced while the needle is out of the cloth.

The tension device which I employ, and which constitutes one of the features of my invention, consists of a smooth cylindrical roller, S, arranged to turn freely on a fixed pivot, *s*, and a smooth spring, T, attached to a fixed support, *t*, and arranged to press the thread against the periphery of the said roller with more or less force, regulated by a set-screw, *u*, which is screwed through the standard *t* in such a manner as to press upon the said spring. The thread on its way from the spool U to the needle passes between the roller and the spring, passing also through two fixed guides, *v v*, which serve to give it a slight bend against the roller. In passing between the roller and the spring the thread gives motion to the roller upon the pivot *s*, and has a friction produced upon it by the spring, and the friction thus produced upon it between the roller and the spring is more uniform than can be produced between two smooth stationary surfaces or two rollers.

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

1. So constructing the needle-cam I′ and shuttle-cam L′ and so combining them with each other and with the rock-shafts for operating the needle and shuttle that they will operate in proper relation to each other to produce the sewing in whichever direction the

cam-shaft B or driving wheel or pulley rotates, substantially as herein specified.

2. The feed-cam J and presser-cam K, combined with each other and with the presser H to operate upon the latter and produce the feed movement in one direction or the other, according to the direction of the revolution of the main shaft, driving-wheel or driving-pulley, substantially as herein specified.

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Witnesses:
T. W. SALISBURY,
A. A. BROWN.