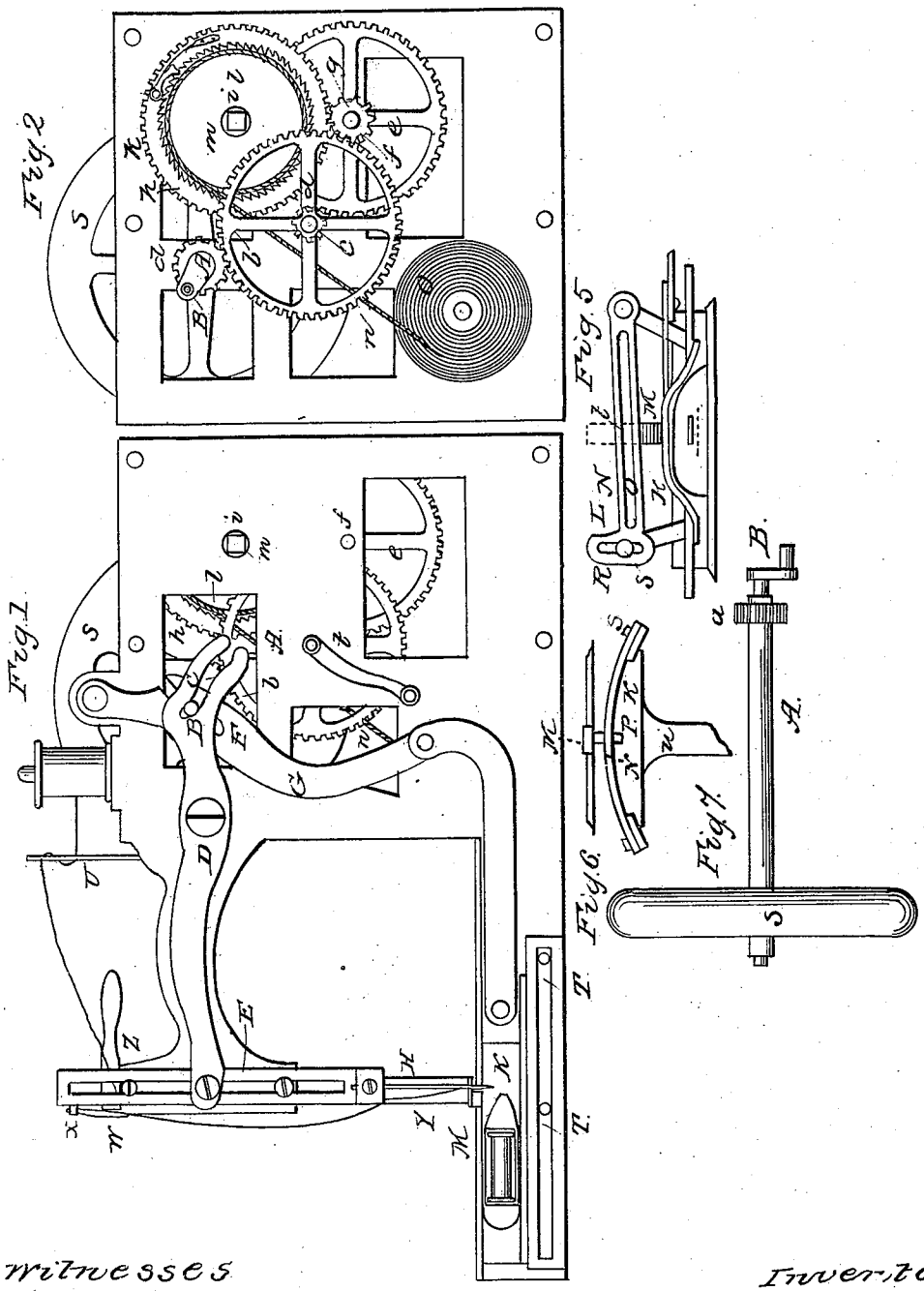
2 Sheets—Sheet 1.

W. S. HALL.

Sewing Machine.

No. 36,084. Patented Aug. 5, 1862.



Witnesses
F. W. Hund
John A. Hitter.

Inventor
William Smith Hall.

2 Sheets—Sheet 2.

W. S. HALL.

Sewing Machine.

No. 36,084.

Patented Aug. 5, 1862.

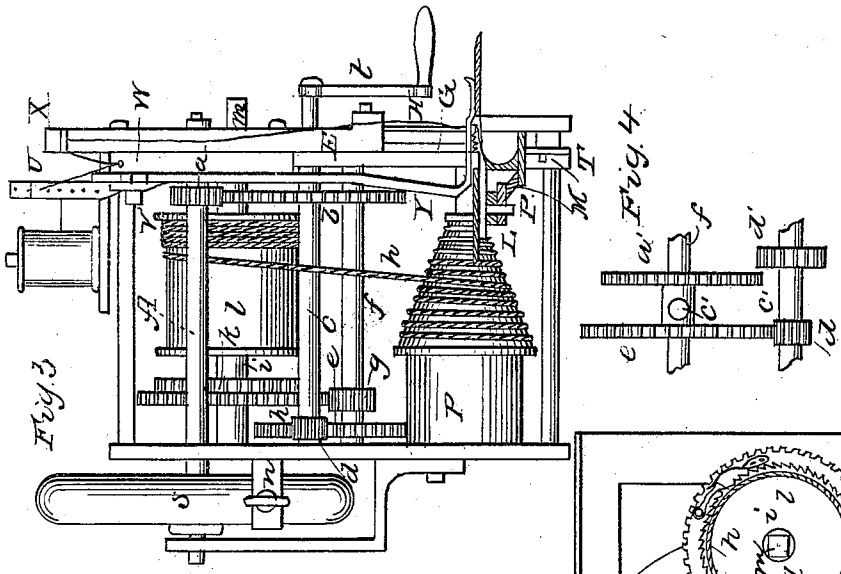


Fig. 3.

Fig. 4.

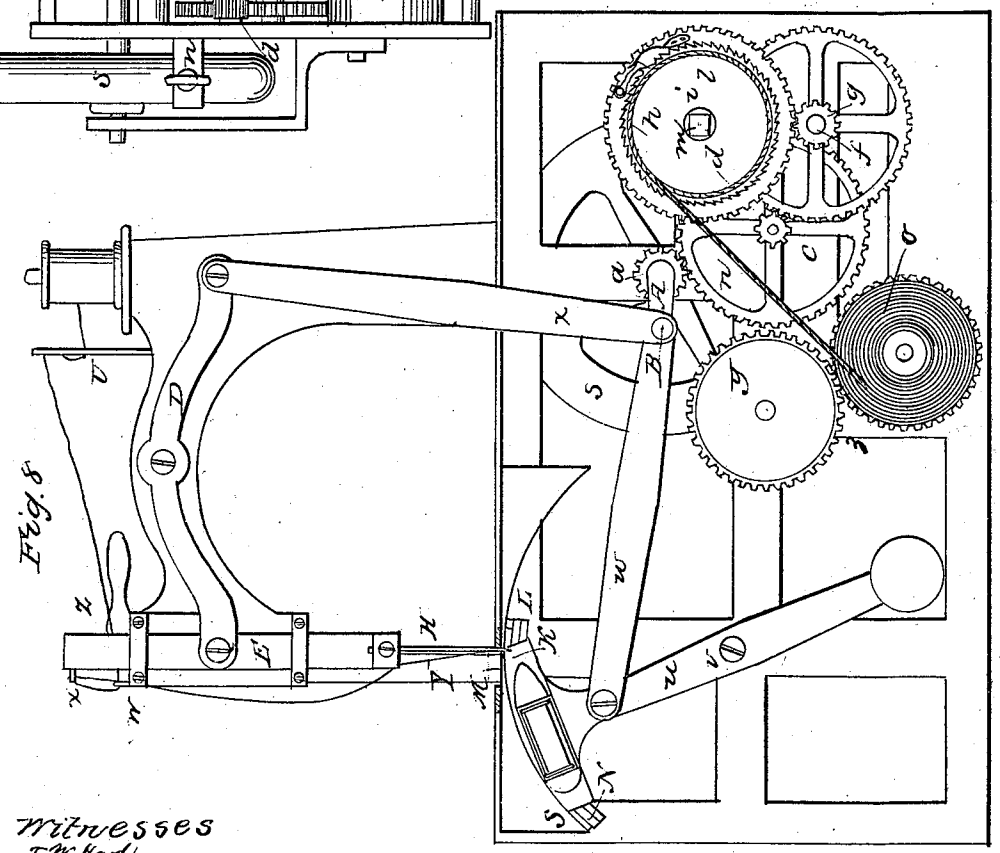


Fig. 5.

Witnesses
F. W. Hard
John F. Kitton.

Inventor
William Smith Hall.

UNITED STATES PATENT OFFICE.

WILLIAM SMITH HALL, OF MILTON, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **36,084**, dated August 5, 1862.

To all whom it may concern:

Be it known that I, WILLIAM SMITH HALL, of Milton, in the county of Norfolk and State of Massachusetts, 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 construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, and to the letters of reference marked thereon.

Figure 1 is a front elevation. Fig. 2 is a sectional view. Fig. 3 is an end view. Fig. 4 is a gear for increasing power. Fig. 5 is a top view of the shuttle-box and guide for feeder. Fig. 6 is a back view of the shuttle-box and guide for feeder. Fig. 7 is the central shaft. Fig. 8 is a sectional view of a modified form.

The nature of my invention consists in the arrangement of the shuttle-box and feeder-guide so as to dispense with the friction that is caused by the race and slide; also in constructing the feeder-guide in such a manner that a uniform motion is produced with the least possible friction.

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

On one end of the central shaft, A, is a crank, B, which works in an eccentric slot, C, in the end of the vibrating arm D. The opposite end of the vibrating arm is attached to the needle-holder E. The crank also works in the eccentric slot F in the shuttle-arm G. These eccentric slots are at right angles with each other, and are so formed that the crank moves the two arms alternately, so that while the needle H is passing down through the cloth the shuttle remains stationary. After the needle has passed down, the shuttle moves forward to make the stitch. The needle then moves up and the shuttle moves back.

Attached to the shuttle-box K, and moving with it, is the reciprocating guide L of the feeder M. The guide consists of a reciprocating bar, N, in which is a straight slot, O, in which works a pin, P, connected with the feeder M. When the shuttle moves forward to make the stitch, the feeder is drawn back toward the needle. After the needle leaves the cloth the shuttle passes back, and the feeder is pressed forward, (the teeth acting upon the cloth,) taking the cloth with it.

The length of the stitch is governed by means of a slot, R, on the end of the bar N, and through which passes the set or thumb screw S, upon which the bar may be shifted, and by which it is secured in position.

The shuttle-box is so constructed as to slide on the pivots T T, taking the shuttle with it, instead of having the shuttle slide on a race, as it does in some machines, thereby dispensing with considerable friction.

The drag or tension on the thread is produced by passing the thread through the holes in the upright bar U, which turns on a set or thumb screw, V. The tension can be increased or diminished by moving the bar forward or back. After the thread leaves the bar it passes through a hole, W, in the top of the stationary needle-arm, then through a hole, X, in the needle-holder E. As the needle-holder moves up from the stationary arm it takes up the slack thread that is caused by the shuttle passing through when the stitch is made. The cloth is held down in its place by the presser Y, which is adjusted by the lever Z.

On the central shaft, A, is a pinion, *a*, in which works a gear-wheel, *b*. On the shaft *c* of the gear-wheel *b* is a pinion, *d*, in which works the gear-wheel *e*. On the shaft *f* of the gear-wheel *e* is a pinion, *g*, in which works the driving gear-wheel *h*. On the shaft *i* of the gear-wheel *h* is a ratchet-wheel, *k*, and a barrel or drum, *l*. The end *m* of this shaft *i* is made square to receive a key for winding up the machine.

Attached to the barrel *l* is a cord, *n*, which is also attached to the fusee *o*. On the shaft of the fusee is a coiled spring, *p*, which is the propelling or driving power of the machine, thereby dispensing with the treadle or hand power. The fusee is a conical-shaped barrel so grooved that a cord can be wound on it. If the spring were attached to a straight barrel, the power would be decreased by every turn of the spring as it was unwound. By making the barrel of a conical form, the circumference of the barrel is decreased to correspond with the decrease of power in the unwinding of the spring, so that the power applied to the driving-wheel is uniform and continued until the power of the spring is exhausted by its being

entirely unwound. The motion of the machine is stopped by the thumb-screw *r* or its equivalent acting on the balance-wheel *s* on the shaft A. The machine is started by relieving the pressure of the thumb-screw on the balance-wheel, and by slightly turning the crank *t* on the shaft *c*. The crank *t* on the shaft *c* is also used for assisting the neeele through seams when necessary, and for giving a motion to the machine when setting the needle.

Fig. 8 is a view of a modified form of a machine. An arm, G, vibrates on a center pin or arbor, *v*, in a vertical plane. On the top of this arm the shuttle-box K and feeder-guide L are permanently attached. The lower end of the arm is made sufficiently heavy to balance the shuttle-box on the top. One end of a connecting-rod, *w*, is attached to the vibrating arm. The other end of the rod is attached to the crank B. At a right angle with this rod another connecting-rod, *x*, is attached to the crank and to the vibrating needle-arm D, so as to move the needle and shuttle alternately.

The shuttle-box and feeder-guide are constructed the same as in Fig. 1, with the exception that the guide forms the segment of a circle, as in Fig. 6, to correspond to the arc in which vibrates the arm G in Fig. 8.

Fig. 5 shows a top view of the shuttle-box and feeder-guide as it is constructed for both machines.

By having the shuttle-box and feeder-guide attached to an arm that vibrates on its center, it obviates the necessity of a slide, thereby dispensing with a great deal of friction. The driving or propelling power is the same in both machines. By the direct application of the power to the vibrating needle-arm and vibrating shuttle-arm without the use of cams or an eccentric motion, as shown in Fig. 8, there is a reduction of friction, and consequently a great saving of the power required to drive the machine. As a matter of utility and convenience the coiled spring, instead of being attached to the shaft of the fusee, as in Fig. 3, is inclosed in a box, *y*, which is connected with the fusee by the gear-wheel *z*.

In constructing a machine for family use that will sew from fifteen to twenty yards with once winding up I make my wheels and pinions of the following relative proportions: The pinion *a* on the central shaft, A, is three-quarters of an inch in diameter. The gear-wheel *b*, that connects with this pinion, is five times the size of the pinion, or three and three-quarters inches in diameter. The pinion *d* on this shaft is half an inch in diameter. The gear-wheel *e*, that connects with this pinion, is four inches in diameter. The pinion *g* on this shaft is also half an inch in diameter, and the driving gear-wheel *h*, which connects with this pinion, is four inches in diameter. The barrel or drum *l* is two inches in diameter. The cord should be long enough to require twenty-five turns of the barrel to wind it up. This will require a lifting-power of the spring of about eighty pounds to drive the machine. By having the crank of the key for winding it ten inches long, it will require a pressure on the crank-handle of eight pounds to wind up the machine. The balance-wheel *s* on the shaft A should be about five inches in diameter and weigh about three pounds. This would give sufficient power for ordinary sewing. When it is necessary to increase the power on the same machine, I do so with the gear-wheels as shown in Fig. 4. These consist of two gear-wheels, *e* and *a'*, which are placed on a hollow shaft, *b'*, and attached to the shaft *f* by a set-screw, *c'*, or its equivalent. The wheel *e* is four inches in diameter, and works in the pinion *d*. The wheel *a* is three and three-quarters inches in diameter. By changing the gear the wheel *a'* will work in the pinion *d'*, which is three-quarters of an inch in diameter, and the power will be nearly doubled; but the duration of its running at each winding up will be correspondingly decreased.

A machine can be made to sew a greater or less number of yards at each winding up by varying the proportions and number of the wheels and pinions and increasing or decreasing the power of the weight or spring.

I do not claim as my invention the making a seam with a needle and shuttle; nor do I claim as my invention the application of a spring or weight as a motive or propelling power.

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

1. Attaching the shuttle-box K and feeder-guide L to the vibrating arm G, and this I claim whether applied to a shuttle moving in the arc of a circle or to a reciprocating shuttle, substantially as described.

2. The adjustable reciprocating bar N, in which is the slot O, wherein works the pin P as a guide for and regulator of the feeder M, as described.

WILLIAM SMITH HALL.

In presence of—
F. W. HURD,
JOHN F. KILTON.