G. Cuppers.

Automatically Operating Sewing-Mach.

No 72607 Patented Dec. 24, 1867.

Fig. 1.

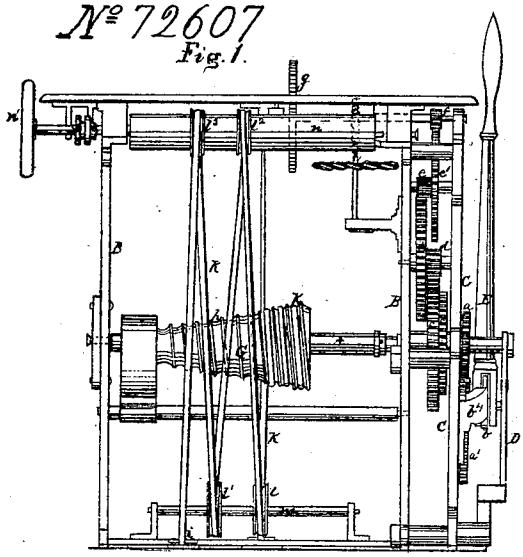


Fig. 2.

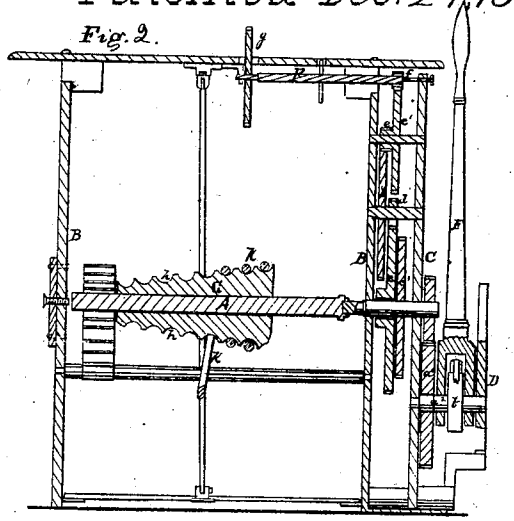


Fig. 5.

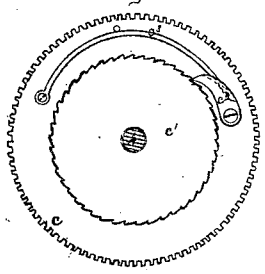


Fig. 4.

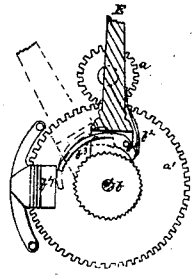


Fig. 3

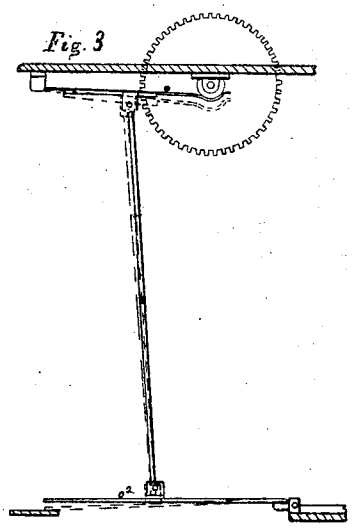


Fig. 6

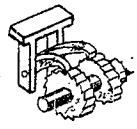
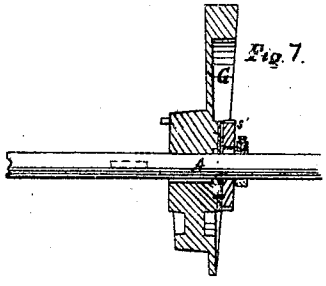
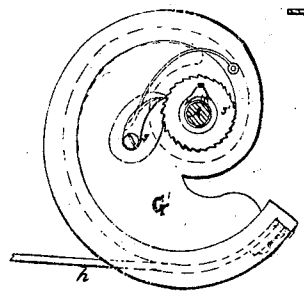


Fig. 7.





Witnesses.

Chas. Page jr.

Inventor. Gustavus Cuppers.
by his attorney.

A. Pollok

United States Patent Office.

GUSTAVUS CUPPERS, OF NEW YORK, N. Y.

Letters Patent No. 72,607, *dated December* 24, 1867.

AUTOMATICALLY-OPERATING SEWING-MACHINE.

The Schedule referred to in these Letters Patent and making part of the same.

TO WHOM IT MAY CONCERN:

Be it known that I, GUSTAVUS CUPPERS, of New York, in the county and State of New York, have invented certain new and useful Improvements in Spring-Power Mechanism for Automatically Operating Sewing and other Machines; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a rear elevation of an apparatus constructed in accordance with my invention.

Figure 2 is a longitudinal section of the same, in a plane passing through the axis of the main or driving shaft.

Figure 3 is a side elevation of the brake for regulating the movement, and the parts with which it is immediately connected.

Figures 4, 5, and 6 are views of detached parts, to be hereafter explained; and

Figures 7 and 8 represent, in section and elevation, a modified form of the conical barrel and rubber spring.

The use of spring-power for actuating sewing-machines and other machinery has been often attempted heretofore, but all such attempts have failed to attain the desired result, or to render the application of spring-power, in this connection, of any great practical value or importance. The failure of the attempts in this direction is due, in great measure, to the defective nature of the means employed to create the power, ordinary metal-barrel spiral springs being usually employed for this purpose, similar to those employed in watch or clock-movements. It is practically impossible, with such springs, to obtain the requisite power and speed, without making the machine too cumbersome and unwieldy, and, moreover, the springs are costly, require great care and expense to be properly manufactured, and are constantly breaking or becoming deranged.

It is the object of my invention to obviate all these difficulties, and to produce a machine or mechanism in which the spring-power is obtained in a simple manner, and by the employment of simple and inexpensive means.

To this end, my invention consists principally of the application and use of one or more ropes or belts of vulcanized rubber, instead of the ordinary metal spring, in combination with the usual system of shafts and gears, for imparting the necessary movement to the sewing or other machine to be operated.

The rubber rope or belt is used in connection with a spirally-grooved conical barrel, mounted upon the main or driving shaft of the apparatus. One end of the belt is firmly secured to the stationary frame of the apparatus, while the other is attached to the larger end of the barrel. When the shaft, and barrel which it carries, are revolved, as in the ordinary clock-movement, or by means of a lever, as hereinafter explained, the rubber belt will be wound around the barrel, following the spiral groove, and becoming stretched in proportion to the extent of the revolutions made by the barrel. In proportion as the rubber becomes more stretched, (possessing, therefore, greater contractible power,) the cone or barrel diminishes in diameter, compensating for the increased power, and causing the shaft, when put in motion by the rubber spring, to move at all times at an even rate of speed.

This is an important advantage, and one that cannot be obtained by the use of ordinary coiled springs, which, of course, cause the shaft to revolve faster when they are tightly coiled than when the tension is relaxed. But under my invention, in proportion as the rubber unwinds from the barrel, and loses its power, the barrel increases in diameter, thus affording a greater leverage for the rubber, and enables it, with decreased power, to revolve the shaft at the same rate of speed as when it was most extended or stretched.

The manner in which my invention is or may be applied will be readily understood by reference to the accompanying drawings.

I will first describe the mechanism by which the main or driving shaft is connected both with the machine to which motion is to be communicated, and with the lever or other suitable device by which it is revolved, in order to wind up the spring, and will then explain the method of applying the rubber rope or belt hereinafter named.

The frame in which the whole of the mechanism is mounted is intended for a sewing-machine, but it is evident that the mechanism may be applied to any other machinery where motive-power of the kind herein mentioned is needed.

The main or driving shaft A is mounted in bearings, in the sides B of the frame, as shown in fig. 2. The shaft extends out through one of the sides, and upon the extreme end is mounted a pinion, *a*, which gears with

a toothed wheel, a^1, mounted upon a shaft, a^2, supported in bearings formed in a plate or upright piece, C, arranged outside of and parallel with the side B of the frame, and in a smaller plate, D, or standard outside of and parallel with the upright plate C. Upon this shaft is also secured a ratchet, b, which is straddled by a lever, E, mounted loosely on the shaft, so as to swing freely thereon. Between the arms of the lever which straddle the ratchet is pivoted a pawl, b^1, which is pressed down upon the ratchet by means of a spring, b^2. The curved rear end b^3 of the pawl extends out some distance from the lever, and a stop or shoulder, b^4, is formed on the plate C, just back of the pawl; so that, when the lever is swung back to the position shown in red lines, fig. 4, the end of the pawl will strike against the shoulder b^4, and thus tilt back or elevate the front of the pawl, so as to disengage it from the ratchet. Upon that portion of the main shaft which is between the uprights B and C are placed a toothed wheel, c, and ratchet c^1, the two being connected, as in the ordinary clock or watch-mechanism, by means of the pawl c^2, pivoted to the wheel, and engaging with the ratchet, being held in place by means of the spring c^3. When the shaft A revolves to the right, the pawl rides over the ratchet-teeth, and the wheel c remains stationary, but when the shaft revolves in the contrary direction, the pawl remains fixed in the ratchet, and the latter thus carries around with it the toothed wheel. The latter wheel communicates movement to a shaft, F, mounted in bearings in the upper part of the frame, through the medium of the gearing d d', e e', and f, the latter pinion being mounted on the shaft F, as shown in figs. 1 and 2. Upon this shaft is also mounted the toothed wheel g, which moves in an opening formed in the top of the frame, extending up some distance above the said frame, so as to engage with the operative parts, for bringing it in communication with the vibrating needle-arm of the sewing-machine or other machinery which is supported on the frame.

The spring-mechanism for actuating the shaft A is arranged as follows: Upon the shaft is secured a conical barrel, G, on which is formed a spiral groove or channel, h. One end of a belt or rope, k, of vulcanized rubber, or equivalent elastic body, is attached to the base or largest end of the barrel, while the other end is attached to the frame B at any suitable point, as at i. The tension of the rope between these two points should, of course, be sufficient to prevent the rope from being at all slack. In order to employ a rope or belt of the necessary length, without taking up too much room, the rope passes up and down over a series of pulleys or wheels, mounted loosely on rods or shafts, supported in suitable bearings in the frame. The lower pulleys l l^1 are mounted upon the rod m, while the upper wheels, l^2 l^3, encircle the shaft n. There may be as many or as few of these wheels as desired, their number depending upon the length of belting employed. The rubber rope may be either cylindrical in form, or flat.

When the lever E is moved to the right, the pawl b^1 causes the ratchet b to revolve. This movement, through the medium of the wheels a^1 and a, is communicated to the shaft. As the pawl c^2, in this movement, rides over the teeth of the ratchet c^1, the wheel c remains stationary, and there is thus no movement of the system of gears above the said wheel. As the shaft A revolves, it carries with it the conical barrel G, and as the rubber belt is attached to the barrel, the revolution of the latter causes the rubber rope to be gradually stretched and wound upon the barrel, following the spiral groove h. In proportion as the rubber becomes more stretched the diameter of the cone diminishes, thus compensating for the increased power generated by the increasing expansion or extension of the rubber.

The system of pulleys, l l^1 l^2 l^3, allow the strain to be equally distributed upon every part of the rope; but, in order to facilitate the operation, and to prevent the possibility of any one part of the rope from being unduly or disproportionately stretched, I mount on the shaft n a hand-wheel, n^1, and two ratchets n^2 n^3, whose teeth, as shown in fig. 6, are turned in opposite directions. Two pawls, m^2 m^3, corresponding to the ratchets m, are also employed. By turning the shaft in either direction, as required, the upper wheels will be revolved, so as to carry the rubber towards the point where the rope is unduly stretched. The right or the left-hand pawl and ratchet are used, (the other pawl being thrown back, so as to be disengaged from its ratchet,) according to the direction in which the shaft is to be revolved.

After the rope has been wound up sufficiently far on the conical barrel, the lever E is thrown back to the position shown in red lines in fig. 4, so as to disengage its pawl from the ratchet. The contractible power of the rubber rope will now draw the barrel and shaft around, in an opposite direction from that in which they were revolved by the lever E, and, in this movement, the motion is communicated to the wheel c by the ratchet c^1, which becomes locked with the pawl c^2. This motion is imparted to the shaft F and wheel g through the medium of the gearing above described, the speed or rate of revolution being gradually increased, by means of the varying diameters of the wheels, so that the necessary velocity is imparted to the revolution of the wheel g.

In order to regulate the speed of the wheel g, I employ a friction-brake, constructed and arranged as shown in fig. 3. The brake is composed of a plate-spring, o, one end of which is secured to the under side of the top of the frame B, while the other extends out, and is curved, so as to fit upon the hub of the wheel g. A rod, o^1, is hinged to the spring-brake, and at its lower end is pivoted to a treadle or foot-piece, o^2. By pressing upon the treadle, the spring-brake is drawn down away from the hub of the wheel, as represented in red lines. When the foot is removed from the treadle, the recoil of the spring-brake forces it up tightly against the hub, and instantly checks the revolution of the wheel. By graduating the pressure upon the treadle, the brake may be made to press with greater or less force against the hub, so as to cause the wheel to revolve at any rate of speed desired.

In figs. 7 and 8 a modified form of the conical barrel G is shown. As this barrel is short, the belting need not be of such length as represented in fig. 1.

The band I prefer to use is thick and broad and flat, instead of cylindrical. When such a band, h', attached to the barrel G', as represented in the drawing, is used, it need only pass under the pulley l, and then be carried up to the top of the frame, where it can be secured in any suitable manner.

I propose to use six or more of such barrels, as represented by G′, upon the shaft A, the said barrels being mounted loosely upon the shaft, and separate from each other, each being provided with a pawl, *s*, which engages with a ratchet-wheel, *s′*, keyed to the shaft. When the shaft, by means of the lever E, is revolved in the direction indicated by the arrow, fig. 8, the ratchet, by engaging with the pawl, carries around the barrel G′, and causes the rubber *h′* to be stretched and wound upon the barrel. Now, if, after the rubber is wound upon the barrel, the latter be held stationary, by means of a hook, or other suitable holding-device, applied to its larger end, *v*, it will be seen that the shaft A is free to revolve, independently of the stationary barrel, in an opposite direction from that indicated by the arrow, the pawl *s* riding over the teeth of the ratchet; but, if the end, *v*, of the barrel is released, the rubber *h′* will commence to contract, and will draw around the barrel, whose pawl, *s*, engaging with the ratchet-wheel *s′*, causes the revolution of the shaft.

If it be supposed that six of such barrels are thus mounted on the shaft A, it is apparent that five of the barrels may be held stationary, as above explained, while the sixth is causing the revolution of the shaft. When the rubber of the sixth barrel is nearly unwound, the fifth may be released, and so on, the barrels being successively freed, so as to effect the unintermittent and long-continued revolution of the shaft; or, if much power be needed, two or more barrels may be released at once. In this manner I am enabled to keep the sewing or other machine in motion for three-quarters of an hour, or an hour, without perceptible diminution of power or speed.

An apparatus such as described may be connected, either by belting with the ordinary crank of a sewing-machine, or it may be employed in connection with special arrangements of mechanism for operating the needle-bar, such as described in an application, in my name, for Letters Patent, now pending in the United States Patent Office.

Having now described my invention, and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. The method, herein described, of operating sewing-machines and other machinery automatically, by means of a spring or springs, composed of one or more bands or belts of vulcanized rubber, combined with the driving-shaft of the mechanism for operating said machinery, substantially in such manner that the contractile power of said rubber spring or springs, when stretched and wound upon the driving-shaft, shall cause the rotation of said shaft, as and for the purposes set forth.

2. The combination with the main or driving shaft A of the rubber-spring band or belt and spirally-grooved conical barrel, upon which said band is wound, substantially as and for the purposes set forth.

3. The combination, with the main shaft and the ratchet-wheel *s′*, of the barrel G′, and pawl for engaging with said ratchet, under the arrangement and for operation as set forth.

4. The combination of the lever E, and the spring-pawl which it carries, with the ratchet-wheel *b*, and stop or projections formed in rear of said wheel, substantially in the manner and for the purposes set forth.

5. The combination of the driving-shaft and its conical barrel with the lever, pawl, and ratchet-wheel, and gearing for effecting the revolution of said shaft, under the arrangement and for operation as set forth.

6. The combination of the rubber band, applied to its conical barrel as described, of the pulleys or wheels upon which said band is stretched, mounted on the frame of the machine, substantially as and for the purposes set forth.

7. The combination, with the driving-shaft, revolved by means of a rubber-spring band or belt, as described, of the shaft F, and gearing, through the medium of which the said shaft is caused to rotate, arranged and operating as herein specified.

8. The combination, with the wheel for actuating the sewing or other machine, of the friction-brake, constructed and applied to said wheel in the manner as set forth.

In testimony whereof, I have signed my name to this specification before two subscribing witnesses.

GUSTAVUS CUPPERS.

Witnesses:

CHAS. SCHAFFURE,

A. FISCHER.