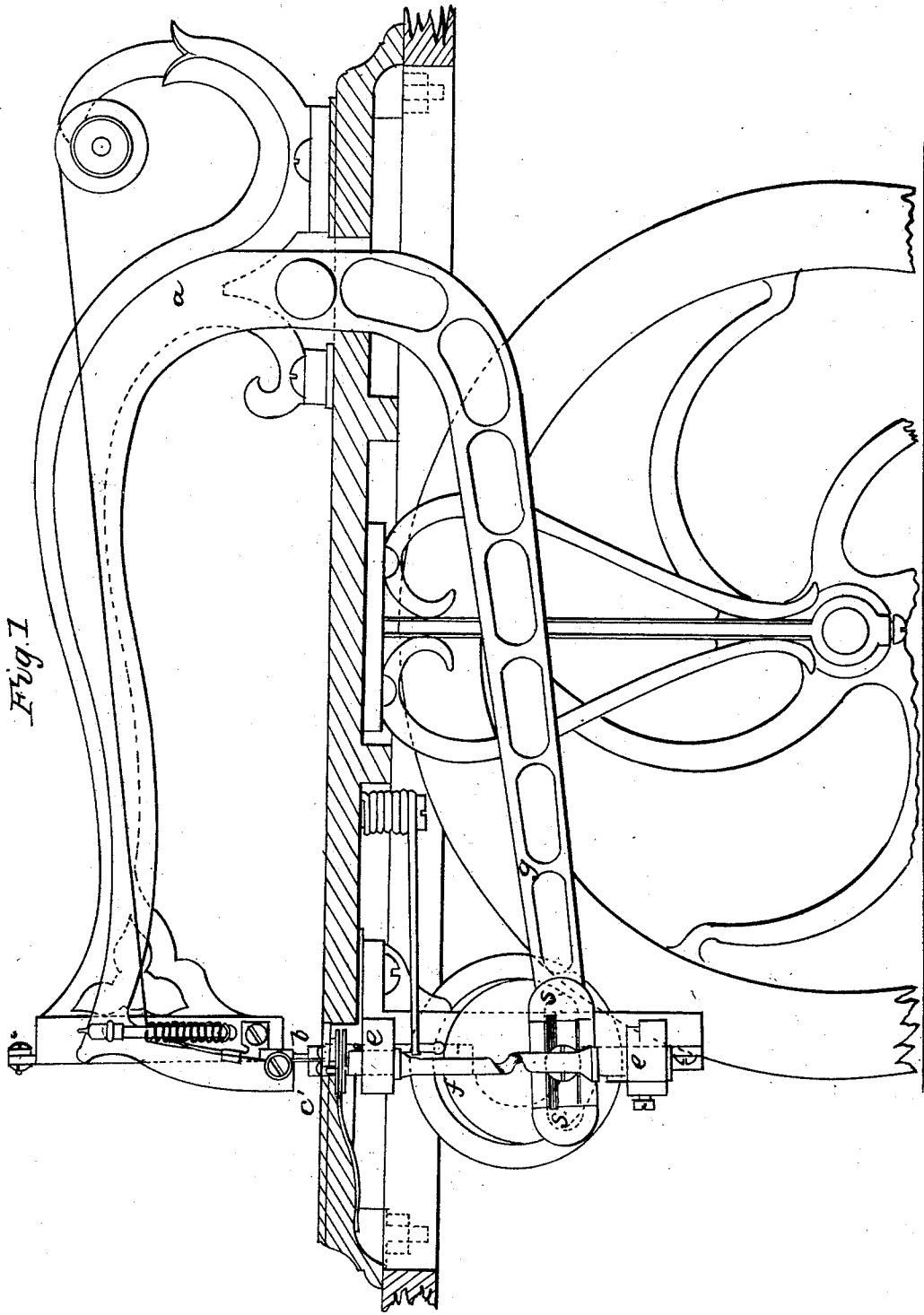


W. O. GROVER.

Sewing Machine.

No. 21,670.

Patented Oct. 5, 1858.

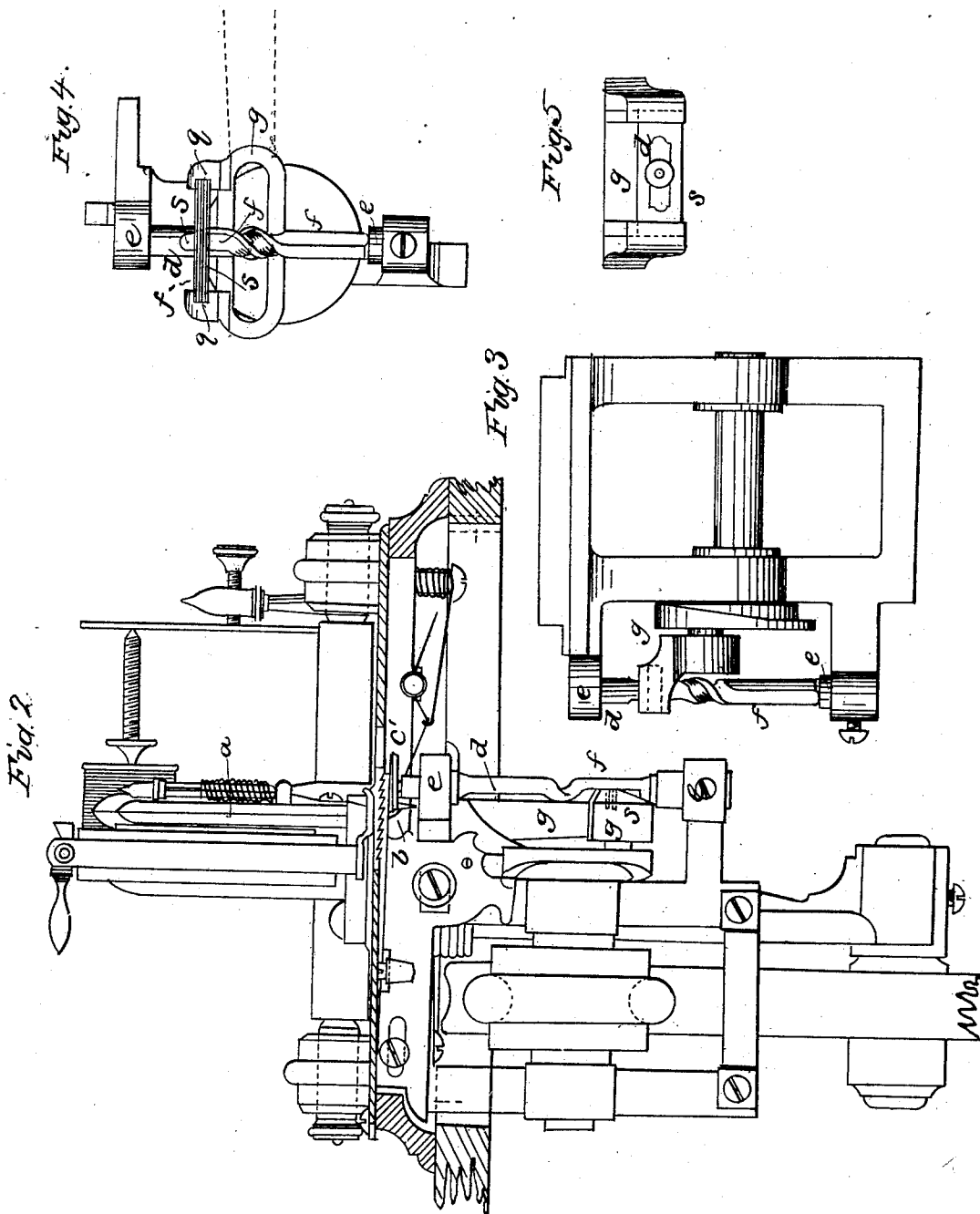


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2 Sheets—Sheet 2.

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# UNITED STATES PATENT OFFICE.

W. O. GROVER, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 21,670, dated October 5, 1858.

*To all whom it may concern:*

Be it known that I, WILLIAM O. GROVER, of the city of Boston, in the State of Massachusetts, have invented certain new and useful Improvements in Sewing-Machines, applicable to those classes of machines in which a curved vibrating needle is employed; and I do hereby declare that the following specification, taken in connection with the drawings, is a full, clear, and exact description thereof.

In the drawings, Figure 1 is a side elevation of a complete sewing-machine. Fig. 2 is a front elevation thereof; and Figs. 3, 4, and 5 are detail drawings of a modification of the apparatus for driving or actuating a curved needle, being respectively a rear elevation, a side elevation, and a plan.

The machine represented in the drawings is of that variety which sewes a chain-stitch with two threads; but my improvements are applicable to other varieties of sewing-machines; and I wish to premise that what I shall call throughout this specification a "curved" or "crooked" needle is not such in the usual acceptation of that term, as it does not pierce cloth, but performs two offices—one of causing a turn of thread to be formed around another needle, and another of putting a thread through a loop formed by another needle; and I also wish it clearly understood that my actuating mechanism may be and is intended to be used in combination with what are termed "hookers-on," (in French *accrochers*,) used for presenting a looper bight to a crochet or hook-pointed needle, and also in combination with what are technically known as "loopers," which make a crochet-stitch by joint action with an eye-pointed needle, such hookers-on and loopers having an interrupted vibratory motion, as well as the curved needle, which is specifically described in this specification; and the nature of my invention consists, first, in actuating a curved needle, looper, or hooker-on having an interrupted vibratory motion by means of the combination of an irregular-shaped spiral shaft with a reciprocating driver, both substantially such and acting substantially in the manner hereinafter specified; second, in mounting a reciprocating driver with one or more springs, substantially in the manner and for the purpose specified; third, in combining with such springs layers of rawhide, leather, or equiva-

lent material, for the purpose desired, substantially in the manner and for the purposes specified; and, lastly, in fitting either springs or stiff pieces of material or springs compounded with hide, &c., into a driver in such manner that they are free to slide in planes perpendicular, or nearly so, to an irregular shaft, which they surround or embrace, substantially in the manner and for the purpose specified.

The machine represented in the drawings is one that forms the stitch known to the trade as the "Grover & Baker" stitch, and is provided with a needle-arm, *a*, carrying a needle, *b*, and with proper spool-holders, tension apparatus, feed and driving mechanism, and all necessary adjuncts for making up a complete sewing-machine, (not described, as they form no part of this invention,) and also with a crooked needle, *c'*, which, while sewing, must vibrate through certain arcs at proper times, and must pause or rest at determined intervals for such a period as may be necessary. This needle is mounted upon one end of an irregular spiral shaft, *d*, supported at top and bottom in proper boxes, *e e*, so that it is free to vibrate or rock. This shaft *d*, at or near the center of its length, is formed either somewhat like the American auger, as shown in Figs. 3 and 4, or like an American gimlet, as shown in Figs. 1 and 2, being either a single or double threaded screw, while the thread or threads, as the case may be, terminate or gradually run into flat surfaces whose planes are parallel, or nearly so, to the axis of the shafts. These flat surfaces are shown at *f f*. In close proximity to this shaft is supported a vibrating or reciprocating driver, such as *g*, mounted in the present instance on a center, and receiving motion through some appropriate connection with the driving-shaft. In a proper box or slots in this driver are mounted or confined in any suitable manner one or more springs, *s s*, which lie in contact with the flat parts of the shaft or bear against the screw thereof in different positions of the driver if the shaft be single-threaded; or, if the shaft be double-threaded, these springs embrace it, as clearly shown in Figs. 3, 4, and 5.

By inspection of the drawings it will be perceived that when the driver is at one end of the shaft and commences to rise, it holds the shaft at rest so long as the springs or driving-

surface rest against the flat surfaces; but when the springs reach the screw they cause the shaft to turn and rock until they arrive at the flat surface or surfaces at the other end of the shaft, when they will stop its revolution and hold it at rest until the driver by reciprocating in the opposite direction again brings the springs in contact with the screwed portions of the shaft.

Now, it will be clear to any mechanic that the shaft may be vibrated through any required arc by a proper number of turns or parts of a turn of a screw-thread, and that its velocity of vibration will depend upon the pitch of the thread and the speed of the driver, and that the time and period of its rests depend upon the location of the flat pieces and their length as compared with the velocity of the driver. Proper attention to these points will enable a competent mechanic to vibrate the shaft when and to what extent he pleases; and by using a screw of varying pitch or one with reversed threads he may also accelerate or retard any part of a vibration or cause the shaft to oscillate backward without any pause.

The driver may have a proper actuating-surface formed upon or attached to it, thus dispensing with springs; but springs serve to diminish the jar occasioned by the driver striking the screw parts of the shaft on leaving the flat surfaces, and I have found the best arrangement to consist in letting several pieces of watch or clock spring into an opening in the driver, as shown in the drawings, and in order to diminish the noise and rattle of these springs I interlayer them with pieces of rawhide, leather, or other similar material, for the purpose, (see *q q*, Fig. 4,) which serve also as reservoirs of oil, so that it is not necessary to apply oil so often to the points of contact of the shaft and driving-surface.

When a single-threaded shaft is employed, as shown in Figs. 1 and 2, the springs must be fast in the reciprocating driver or else held against its surface by a spring-pressure; but when a double-threaded shaft like that shown in Figs. 3, 4, and 5 is used, then the springs are to embrace the shaft, being slotted out, as in Fig. 5, and merely rest in slots in the driver, being free to slide in planes perpendicular to the shaft, or nearly so. This latter modification my own experience proves to be the best, as either the driving-arm or the shaft itself may get materially out of adjustment

without affecting the proper successful action of the machine, as the springs will accommodate themselves to any moderate amount of deviation of either shaft or driver from their originally-adjusted position.

In the drawings the driver is shown as making part of an arm which vibrates on a center; but it may be attached, supported, and moved in any convenient manner so long as the actuating-surface, whatever it may be, moves to and fro to a proper distance in contact with the shaft that carries the curved needle. This crooked or curved needle, being firmly secured to the shaft, partakes of all its oscillations and pauses, and the precise duty that such needle is required to perform in order to the successful action of the machine will, as before referred to, govern the precise shape of the flattened and screwed shaft, and the speed and length of vibration of the actuating-surface of the driver.

Having thus described my improvement, I claim as of my own invention—

1. The combination, with a curved needle or hooker-on or looper, of an irregularly-shaped spiral shaft and a reciprocating driver, both substantially such as hereinbefore specified, and constituting an apparatus for imparting the required motions and pauses to a crooked needle, substantially in the manner specified.

2. Mounting a driver, combined with and acting upon a spiral shaft, both substantially such as described, with a spring or springs, substantially in the manner and for the purpose specified.

3. Combining such springs with layers of rawhide, leather, or similar material, when acting upon and in combination with a spiral shaft, substantially in the manner and for the purposes specified.

4. An actuating-surface substantially such as is specified, so formed as to surround or embrace an irregular screwed shaft, and at the same time free to slide in a driver in planes perpendicular, or nearly so, to such a shaft, substantially in the manner and for the purposes specified.

In testimony whereof I have hereunto subscribed my name, in the city of Boston, on this 21st day of December, A. D. 1857.

WM. O. GROVER.

In presence of—

S. G. GORDON,  
JAMES H. BROWN.