(No Model.) 2 Sheets—Sheet 1.

J. ROBERTSON.

TAKE-UP OR THREAD CONTROLLING MECHANISM FOR SEWING MACHINES.

No. 346,775. Patented Aug. 3, 1886.

Fig. 1.

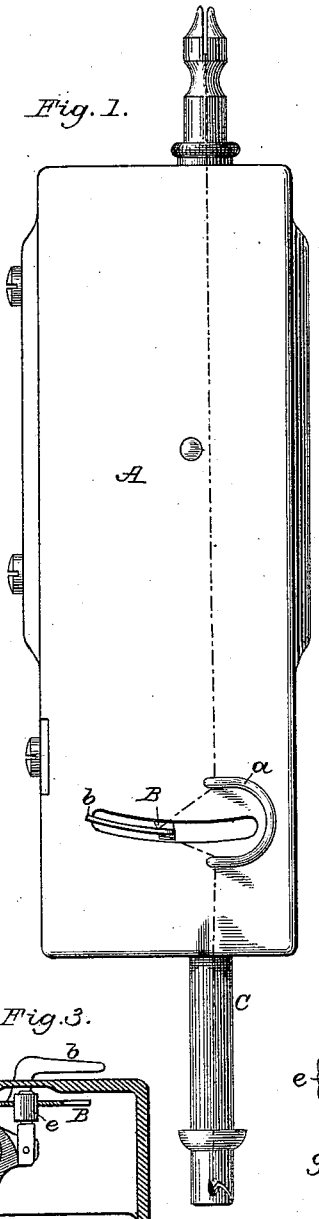


Fig. 2.

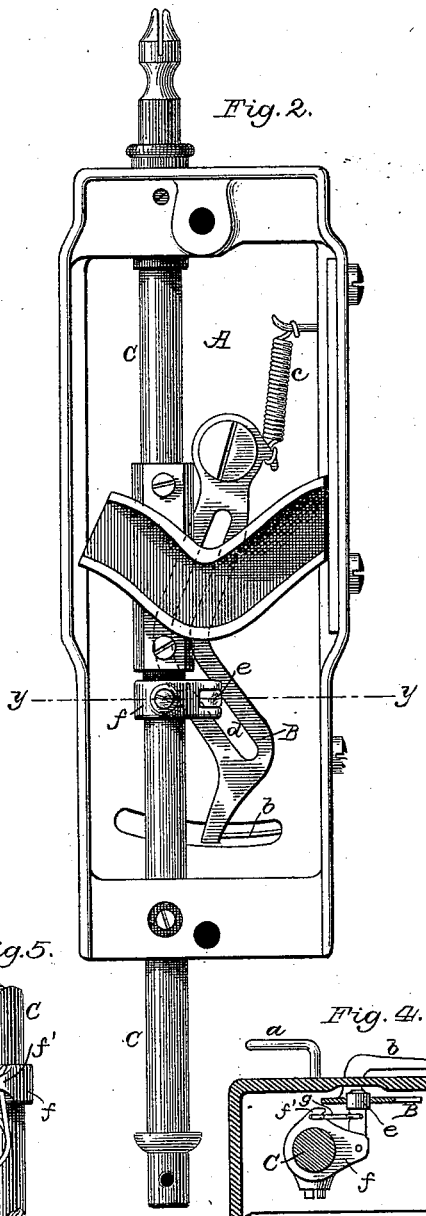


Fig. 3.

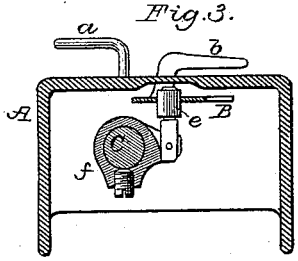


Fig. 5.

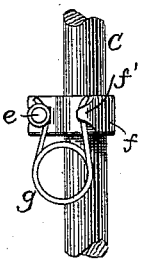
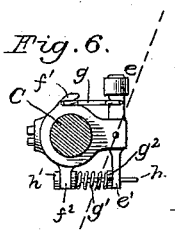


Fig. 4.

Fig. 6.



Attest:

Philip F. Larner.

Howell Battle.

Inventor:

James Robertson.

By Munn & Co.

Attorney.

(No Model.) 2 Sheets—Sheet 2.

J. ROBERTSON.

TAKE-UP OR THREAD CONTROLLING MECHANISM FOR SEWING MACHINES.

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Fig. 7.

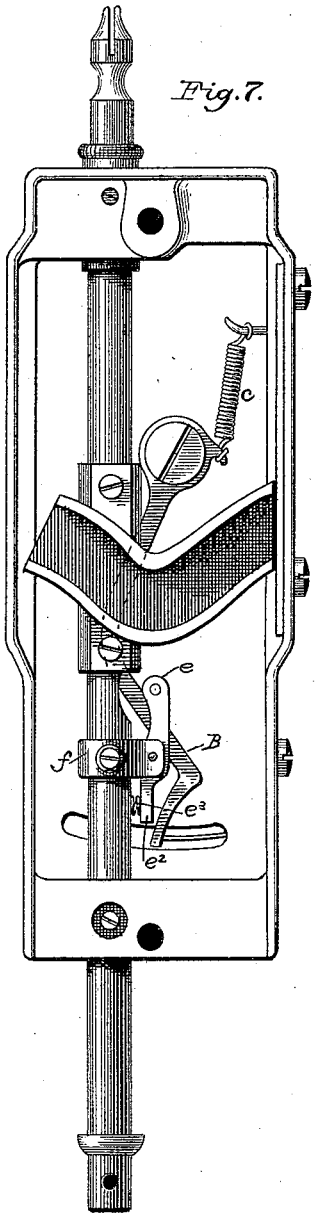


Fig. 8.

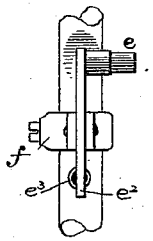
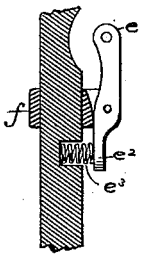


Fig. 9.



Attest:

Philip F. Larner.

Lowell Battle

Inventor:

James Robertson

By Munn & Co

Attorney.

UNITED STATES PATENT OFFICE.

JAMES ROBERTSON, OF NORTHAMPTON, MASSACHUSETTS.

TAKE-UP OR THREAD-CONTROLLING MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 346,775, dated August 3, 1886.

Application filed July 14, 1885. Serial No. 171,590. (No model.)

To all whom it may concern:

Be it known that I, JAMES ROBERTSON, of Northampton, in the county of Hampshire and State of Massachusetts, have invented certain new and useful Improvements in Take-Up or Thread-Controlling Mechanisms for Sewing-Machines; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of my invention.

My said improvements involve the use of the old and well-known forms of vibrating thread arms or levers, which can be actuated by a stud on the needle-bar; and the object of my invention is to secure a smooth, easy, and noiseless operation of a take-up which is positive in its action in at least one direction.

The thread-arms referred to have been heretofore cam-slotted in some cases for the reception of the needle-bar stud, by which they are positively vibrated, and in other cases the stud engages with a cam-faced edge on the arm; but always prior to my invention the take-up-operating stud has been rigidly mounted upon the needle-bar. The gist of my present invention is a take-up-operating stud which is flexibly coupled or pivoted to the needle-bar, so that it will yield to or move laterally with the take-up arm in one direction within certain limits, but will positively move said arm by its sliding contact therewith during a portion of the movement of the needle-bar, because it operates like a stud rigidly mounted on the needle-bar whenever its positive action is desirable.

With cam-slotted thread-arms various provisions have heretofore been made for enabling the arm to yield to tension within certain limits, so as to combine with a positive action of the needle-bar stud and cam-slot the yielding action of a spring—as, for instance, by means of a cam-slot much wider than the diameter of the needle-bar stud or pin, also by means of a supplemental spring thread-arm loosely coupled to a cam-slotted lever, and also by means of a yielding face at one or more portions of the cam-slot in the thread-arm. With such cam-slotted thread-arms my pivoted or yielding needle-bar stud can be variously applied, so that the cam-slot can be practically uniform in width throughout its length, and nevertheless permit the thread-arm a certain free lateral movement in one direction, but be rigid against pressure in the opposite direction; and with this form of thread-arm the take-up-operating stud may or may not be provided with a spring or springs; but if the take-up arm be not slotted, then said stud is essentially provided with a spring which causes the stud to follow up the free movement of the thread-arm and to maintain continuous contact with the cam-faced edge of said arm.

To more particularly describe my invention, I will refer to the accompanying drawings, in which—

Figure 1 is a front view of a sewing-machine head embodying my invention. Fig. 2 is a rear view of the same, illustrating my invention as applied to a cam-slotted thread-arm. Fig. 3 is a horizontal sectional view of the same on line *y*, Fig. 2. Fig. 4 is a view similar to Fig. 3, illustrating the same parts modified in construction and organized with a spring carried by the needle-bar. Fig. 5 is a front view of a part of Fig. 4. Fig. 6 illustrates in section a pivoted needle-bar stud which is capable of vibration laterally in either direction. Fig. 7 is a view similar to Fig. 2, illustrating my improvement as employed in connection with a plain or non-slotted thread arm or lever. Fig. 8 is a view of a portion of the needle-bar and the stud detached. Fig. 9 is a sectional view of the needle-bar, the stud, and its pivotal bearing.

The head A of the machine, Fig. 1, regardless of the particular form in which my invention may be embodied therein, presents in front view an appearance similar to many others, and it has the usual thread-loop, *a*, and also the transverse curved slot, through which the thread-finger *b* of the take-up arm or thread-controlling lever B projects in the usual manner.

I will first describe my invention in connection with the cam-slotted thread lever or arm, as illustrated in Figs. 2 to 6, inclusive.

The take-up lever B, as seen in Fig. 2, is of an old and well-known form, being pivoted at its upper end to the inner surface of the head, and it is provided with a retractile spiral spring, *c*. This lever B has a cam-slot, *d*, which is uniform in width throughout its length, as heretofore employed in other organi-

zations. The novel feature devised by me in this connection is the mode of operatively coupling the needle-bar C to the cam-slotted take-up lever B. Heretofore this has always been accomplished by means of a rigid stud or pin carried by the needle-bar and projecting laterally therefrom into the cam-slot, and the capacity for movement by the take-up lever independently of the needle-bar has been provided for either by having the cam-slot at various portions thereof wider than the thickness or width of the needle-bar stud or by providing one side of said slot with a yielding or spring face. In my organization the cam-slot has a uniform width, and the needle-bar stud fairly fills said cam-slot laterally, so that but little, if any, lost motion is possible between said stud and the coincident sides of the slot; and I provide for the independent movement of the take-up lever by pivoting the stud *e* on the needle-bar, or upon a sleeve, *f*, secured thereto, so that said stud may be vibrated laterally in one direction, but be absolutely rigid in its normal position as against movement in the opposite direction. In most cases I prefer to provide the stud *e* with a friction-roller, as clearly indicated in the drawings. As clearly shown in Fig. 3, the sleeve *f* is mounted on the needle-bar and secured thereto by a set-screw, and said sleeve has ears, between which the stud *e* is pivoted, and the latter is jointed thereto with what may be termed a "knife-blade joint," by which it is enabled to be moved laterally in one direction only from its normal position, or, in other words, in the direction opposite to that in which the take-up lever is actuated by the retractile spring *c*, thus enabling the take-up lever to respond to tension on the thread to the required extent, and to be independent at times of the positive action of the needle-bar stud, but at other times affording the required positive action of the take-up, because of the rigidity of the stud as against pressure in one direction.

It is not essential that the retractile spring *c* be employed, as thus far described, for producing the ends desired, inasmuch as good results can be obtained if the stud *e* be made to operate through a spring applied thereto after the manner of a jackknife-blade, as when the latter approaches or recedes from its fully-opened position—for instance, as illustrated in Figs. 4 and 5. In this case the sleeve *f* has a projecting arm, *f'*, parallel with the pivoted stud *e*, and this latter as well as said arm have coincident spring-seats, with which the interposed spring *g* engages to force them apart, but enabling the stud to vibrate laterally from its normal position in one direction, as before described. As organized in Fig. 2, the spring *c* is uniform in its action, because its relation to the pivoted fulcrum of the take-up lever and to the finger *b*, with which the thread engages, never varies; but as organized in Figs. 4 and 5 the spring *g* is variable in its action, because its relations to said pivoted fulcrum and thread-finger vary according to the varied position of the needle-bar, thus enabling said spring *g* to gradually merge its operation with the positive operation of the take-up lever, which will be found of special value in heavy sewing. In both organizations it will be seen that a spring exerts its force against one side of the needle-bar stud, and that a continuous engagement of said stud with the cam-slotted lever is always afforded, notwithstanding the yielding capacity of said lever, and also that said parts will operate smoothly and noiselessly, and with a consequent minimum liability to wear and derangement. It is, as I believe, broadly new to operatively couple any kind of take-up lever directly to the needle-bar by means of a jointed pin, and I do not therefore preclude myself from so organizing said pin or stud that it can yield laterally in either direction, it being obvious that if said pin be actuated by a spring or springs which, while holding it in its normal position, will admit of a yielding action somewhat after the manner of an ordinary spring wire take-up, and at the same time enable the yielding stud to practically fill the cam-slot, a peculiarly steady, smooth, and noiseless operation will be obtained. Said stud may vibrate in either direction. It will, however, seldom be desirable that the pivoted needle-bar stud be capable of yielding or moving laterally other than in one direction from its normal position; but by having said stud pivoted the cam-slotted take-up lever can, for the first time, as I believe, be made capable of yielding to tension precisely as described in connection with Figs. 1 to 5, inclusive, even if the needle-bar stud be also capable of vibrating in the opposite direction—for instance, as shown in Fig. 6, wherein the same spring, *g*, is employed as in Fig. 5; but in this case the stud *e* has an oppositely-projecting tail-piece, *e'*, through a hole in the top of which a rod, *h*, extends. This rod *h* has a head, *h'*, and is free to slide in bearings in a lug or arm, f^2, on the sleeve *f*, and it is encircled by a strained or compressed expansive spring, *g'*, having for its abutments a fixed washer, g^2, on said rod, and at its opposite end the coincident surface of the lug f^2 or a loose interposed washer. As thus organized, it will be seen that the spring *g* will operate precisely as in Fig. 5, and also that the stud *e* may be deflected or vibrated in the opposite direction, as indicated by the inclined dotted line, by a further compression of the spring *g'*, and that this latter can be of any desired capacity, so as to render the operation of the take-up practically positive in one direction, although capable of yielding in that direction and of more freely yielding in the opposite direction. It will be seen that the needle-bar stud as thus far described is capable of lateral movement toward the needle-bar as the result of pressure applied thereto by the surface of one side of the cam-slot, and that said studs have a comparatively limited range of movement, because of the short dis-

tance between their pivot and their point of contact with the thread-arm. This range of movement can be readily extended by changing the form of the stud, so that while its operative end will stand, as shown, at right angles to the needle-bar, its tail-piece will be parallel with the needle-bar, thus enabling its pivot to be at right angles to said bar, instead of parallel therewith, as when arranged as thus far illustrated. This variation in construction is deemed of special value, and is illustrated in Fig. 7, wherein the stud *e* has a tail-piece, e^2, which is at a right angle to said stud, and is pivoted centrally to the collar *f* upon a transverse point, so that said tail-piece is parallel with the needle-bar. It will be seen that with this form of pivoted stud the latter has a wider range of movement than when pivoted as before described, and said stud always stands at right angles to the plane in which the thread-arm is vibrated, instead of angularly thereto at times, as when mounted on a pivot parallel with the needle-bar. If the stud be thus arranged for co-operating with a cam-slotted thread-arm, it may be without a spring; but if provided with a spring the latter should be applied so as to force the stud away from the needle-bar, as in Figs. 4 and 5. If two springs be used, there would be one at each side of the pivot, as in Fig. 6. When, however, a non-slotted thread-arm is used, the stud should have a spring which will force it toward the needle-bar whenever permitted so to do, as when the power of the retractile spring *c* is overcome by the thread, and therefore said spring will cause the stud to closely follow up and maintain its contact with the thread-arm during all its free movements toward and away from that position of the stud at which it is practically rigid for positively vibrating the thread-arm.

In Fig. 7 the thread-arm B is of the non-slotted form, and beneath the rear end of the tail-piece e^2 there is an expansive spiral spring, e^3, by which the stud *e* would be always thrown inward toward the needle-bar were it not for its contact with the cam-face of the thread-arm and the superior force of the spring *c*. As here shown, the needle-bar is cut away at one side to afford free space for the stud; but this can obviously be avoided, if desired, by merely changing the pivotal point of the tail-piece upon a collar, *f*, correspondingly varied in form and dimensions.

It will be seen that my novel pivoted needle-bar stud in either of the several forms illustrated will effectually secure a continuous contact thereof with the cam-faces of the thread-arm, even if the latter be in either of the old and well-known forms illustrated or in other forms equally well known, and that it also provides for the positive movement of the take-up, as well as its free movement, without the complication incident to spring thread-arms which are separately coupled to slotted levers, and to slotted thread-arms provided with spring-faces, as heretofore employed with rigid needle-bar studs, and when compared with prior combinations of non-slotted thread-arms and rigid needle-bar studs I avoid the shock and noise heretofore due to the intermittent contact of the stud and arm, and secure a smooth, easy, and practically noiseless operation.

I have hereinbefore stated that I believe it to be broadly new to operatively couple any kind of take-up lever directly to the needle-bar by means of a jointed pin or stud. I am, however, aware that a needle-bar and an inflexible take-up lever have heretofore been directly coupled by means of a link pivoted to both, so that the take-up lever was incapable of movement, except as a result of the reciprocation of the needle-bar, and also that a spring take-up lever or arm has heretofore been moved against its spring during a small portion of the downward movement of an awl-bar in a wax-thread sewing-machine by means of a jointed stud on said bar operating to strike and deflect an intermediate inclined spring-lever, which in turn struck the spring take-up lever; but in said combination said stud was jointed for the sole purpose of enabling it to operate as a latch in striking said lever, then sliding over its lower end and permitting the lever to resume its normal position, thus necessitating a latch action by the stud, for enabling it to drop while returning to its upward position above said lever and to resume its normal projecting position, so as to enable it to again strike the lever during the next downward movement of the awl-bar. The smooth, easy, and noiseless operation resulting from my invention is due to the fact that the jointed stud on the needle-bar not only actuates the take-up arm in one direction, but follows the movement of the take-up arm in the opposite direction, whereas in said prior wax-thread machine there was a double hammering action, first between the stud and the inclined lever and next between said lever and the take-up arm; and should the approximate results of my invention be desired in such a machine, the stud on the needle-bar cannot operate as a latch, and the intermediate lever must not only be in continuous contact with said stud, but so, also, must the said lever and take-up arm be always engaged with each other, and thereby obviate all hammering or striking action anywhere between the stud on the awl-bar and the take-up arm.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, substantially as hereinbefore described, of a spring take-up arm or lever, a needle-bar, and a stud which is pivoted on said bar and engages with said take-up arm, and is free to vibrate on its pivot in one direction with the take-up arm, but is rigid as to movement in the opposite direction, for enabling it to positively vibrate said take-up arm or lever during a portion of the movement of the needle-bar.

2. The combination, substantially as herein-

before described, of a needle-bar, a take-up arm or lever, and a take-up-operating stud which is pivoted on said bar and provided with one or more springs for partially controlling its pivotal movements.

3. The combination, substantially as hereinbefore described, of a take-up arm or lever, the needle-bar, and the take-up-operating stud projecting laterally therefrom, and provided with a tail-piece which is parallel with said bar, and by which it is pivoted thereto.

JAMES ROBERTSON.

Witnesses:
E. L. KIRBY,
L. P. BRYANT.