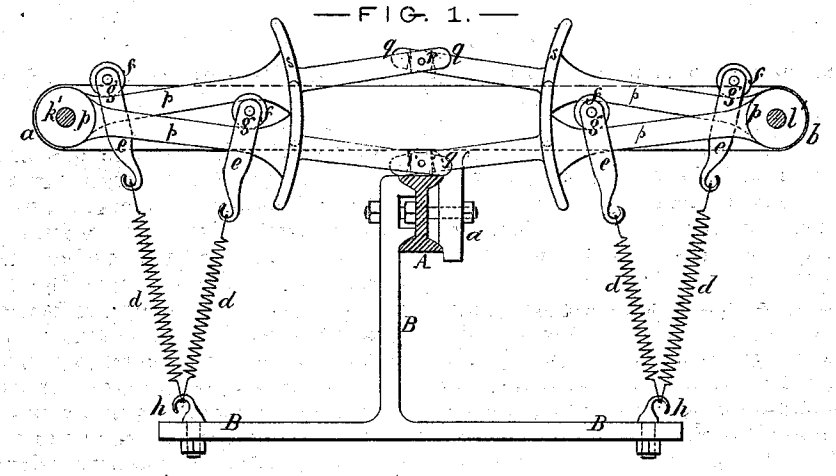
W. GMINDER.

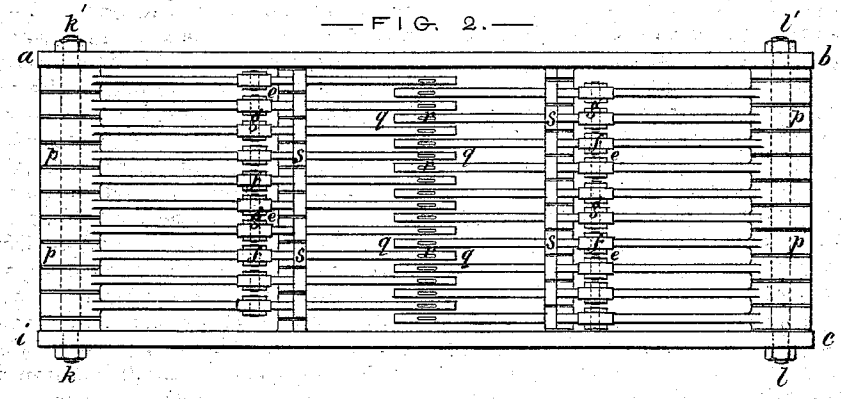
Shedding-Machines.

No. 135,798. Patented Feb. 11, 1873.

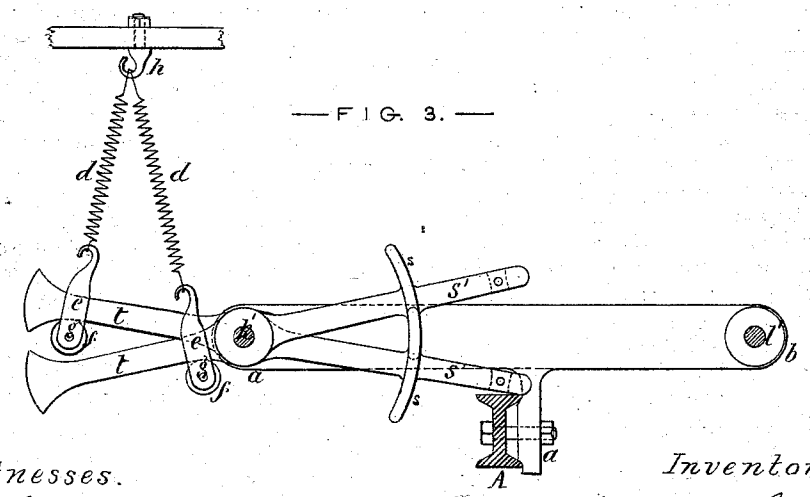
—FIG. 1.—



—FIG. 2.—



—FIG. 3.—



Witnesses.

H. G. Stewart

Magnin

Inventor.

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UNITED STATES PATENT OFFICE.

WILLIAM GMINDER, OF REUTLINGEN, GERMANY.

IMPROVEMENT IN SHEDDING MECHANISMS.

Specification forming part of Letters Patent No. **135,798**, dated February 11, 1873.

To all whom it may concern:

Be it known that I, WILLIAM GMINDER, of Reutlingen, in the Kingdom of Würtemberg, Germany, have invented certain Improvements in Looms, of which the following is a specification:

My invention relates to the treading motion in looms for weaving any kind of fabric requiring more than two heddles in the harness which divides the warp for the passage of the shuttle or shuttles carrying the filling or weft-threads. While in the simplest form of harness the two heddles reciprocally control each other in their alternate rise and fall, the greater number of heddles of a complex treading motion for figured intertextures require each an independent action, so as to admit of the greatest variety of changes in the pattern produced; and instead of their reciprocal connection and movement in pairs, each heddle is furnished with a weight or spring tending to hold it down in its normal position, and effecting a precise return of the heddle to this lower position after each lift by means of the treading mechanism. For several reasons spiral springs appear obviously preferable to weights in this connection with the treading motion, and would have been more generally adopted; but their peculiar action, as heretofore applied, is adverse to the requirements in one important respect; wherefore weights have, in many cases, been used and preferred. When the fact is practically understood that a positive downward pull is needed to keep the heddle and its portion of the warp-threads in the lowest normal position against the counteracting friction of the upward-motion of contiguous heddles, and that, on the other hand, the tension of the portion of the warp-threads drawn up with an elevated heddle adds greatly to the downward pull of the weight or spring, it will be obvious that a uniform weight is more nearly correct, and involves less waste of power than the spring, which, as heretofore applied in this mechanism, must add to its requisite tension for holding down the heddle, all the additional strain due to its further expansion, and to the pull of the warp-threads when the heddle is elevated by the treading motion. This action of the spring involves undue wear and tear of the parts, with waste of operative power; and therefore its application has been mainly limited to treading motions for weaving light fabrics at quick speed; while for heavy goods the more uniform action of weights has been preferred, in many cases even at a loss of speed. Now, the object of my invention is to attain a greater mechanical perfection in the construction and operation of harnesses of this class, by providing a tension which is most effective while the heddle is in its normal lowest position, and which presents the least resistance when the heddle is at its highest elevation, diminishing its power in such proportion to the elevation of the heddle as to compensate for the increasing tensional strain of the lifted portion of the warp. The nature of my invention consists in the application of a spring-tension to the heddles through the intervention of vibrating levers, their inner ends taking hold of the heddles, and one end of the spring being suspended upon the lever between its fulcrum and outer joint by means of a sliding or rolling yoke in such manner that the point at which the power of the spring acts upon the lever shall be furthest from the fulcrum of the lever when the latter is down and the heddle at rest; while with the upward motion of the lever the spring-yoke shall glide toward the fulcrum of the lever, and thus diminish its tensional power to a minimum of resistance, as the heddle approaches its highest position. With the descent of the heddle the yoke again glides smoothly outward upon the lever with due precision and effectiveness. The advantages accruing from this improvement have been most satisfactorily tested, and will be readily evident to those versed in the operation of looms and in the practical requirements for their greater perfection.

On reference to the annexed drawing, making part of this specification, Figure 1 is a side elevation of the part of a loom containing my improvement; Fig. 2 is a plan thereof; and Fig. 3 represents a modification in the construction of my improvement, showing the use of a double-armed lever, one of its arms attached to the heddle, and the yoke and tension-spring plying upon the other arm of the lever, and pulling in the required opposite direction.

The treading mechanism forms no part of my present improvement; and I therefore do not illustrate this mechanism in the drawing. It may be constructed upon the improved plan forming the subject of a separate application for Letters

Patent which I have filed in the Patent Office of the United States previously to the filing of this application; or any other available treading motion may be used without impairing the objects of my present invention.

To the transverse beam A, forming part of the frame structure of the loom, a rectangular frame, *a c i b*, is secured, as shown. This frame carries upon the axles *k k'* and *l l'* the levers *p p*, one set of which is so transposed, relatively to the opposite set, that their converging and overreaching ends *q* may ply clear of each other, the eyes *r r*, by which the heddles are alternately hung to levers of opposite sets, being thus brought in a straight line. Segmental guides *s s* are cast upon the levers *p p* to steady them laterally while in motion. *d d* are the tension-springs; *e e*, the yokes, attached to their upper vibrating ends; and *f f* are rollers running upon axles *g g* between the two cheeks of the yoke, and riding upon the edge of the levers *p q*. Springs *d d* are, at their other ends, hung in hooks *h h* on a casting, B, shaped and secured to beam A in the manner shown at Fig. 1. In this illustration the levers *p p* are seen both in their lowest and highest positions, with the spiral springs, respectively, in the two positions, dependent upon the inclination of the lever in opposite directions. The edge of the lever whereon the roller *f* takes its bearing is curved upward at both ends, so as to arrest the rolling motion of *f* without sudden jar against a positive stop.

The operation of the rolling yokes *e e* and their springs *d d* will now be readily understood. When the heddle and its lever *p* stand down the roller *f* bears at the outermost limit of its travel upon the lever, holding the latter down with the full power of the spring *d*. As soon, however, as the lever is elevated with the heddle, that edge of the lever on which the roller travels changes its angle of inclination respectively to the direction of the pull of spring *d*, the roller glides along the lever toward its fulcrum, and, carrying with it the spring and yoke, lessens the power of the spring by reducing its effective length of lever. This change of the distance of the yoke from the fulcrum may be carried to such extremes that, on the one hand, the power of the spring will be almost eliminated when the heddle is at its highest elevation; while, with but slight loss of tension from contraction of the spring, the latter will, with great precision, glide into a position causing it to act with considerable energy upon a long lever when the heddle is down.

The curved rise of the course of the roller *f* at both ends serves to so ease the action of the roller and spring, that even at the quickest speed of the loom the motion of the yoke will be arrested and reversed in a manner tending greatly to diminish the wear of the harness and of all the parts in connection therewith; and to quiet the whole action of the improved mechanism, which has practically reduced the driving power, by eliminating all undue tension upon the harness at the required intervals and in a manner not heretofore attained by means of either springs or weights.

The modification of my improvement represented in Fig. 3 is clearly evident from the drawing. In this case the lever has two ends, one of which, *s'*, takes hold of the heddle, while the spring and yoke act, in their reversed position, upon the other arm *t* precisely in the manner and with the effect hereinbefore described.

I claim as my invention—

In combination with the harness of a loom, the levers *p p*, springs *d d*, yokes *e e*, rollers *f f*, all relatively arranged to operate in the manner and for the purpose set forth.

WILLIAM GMINDER.

Witnesses:
GEORGE HAMMER,
GILES RÜMMEL.