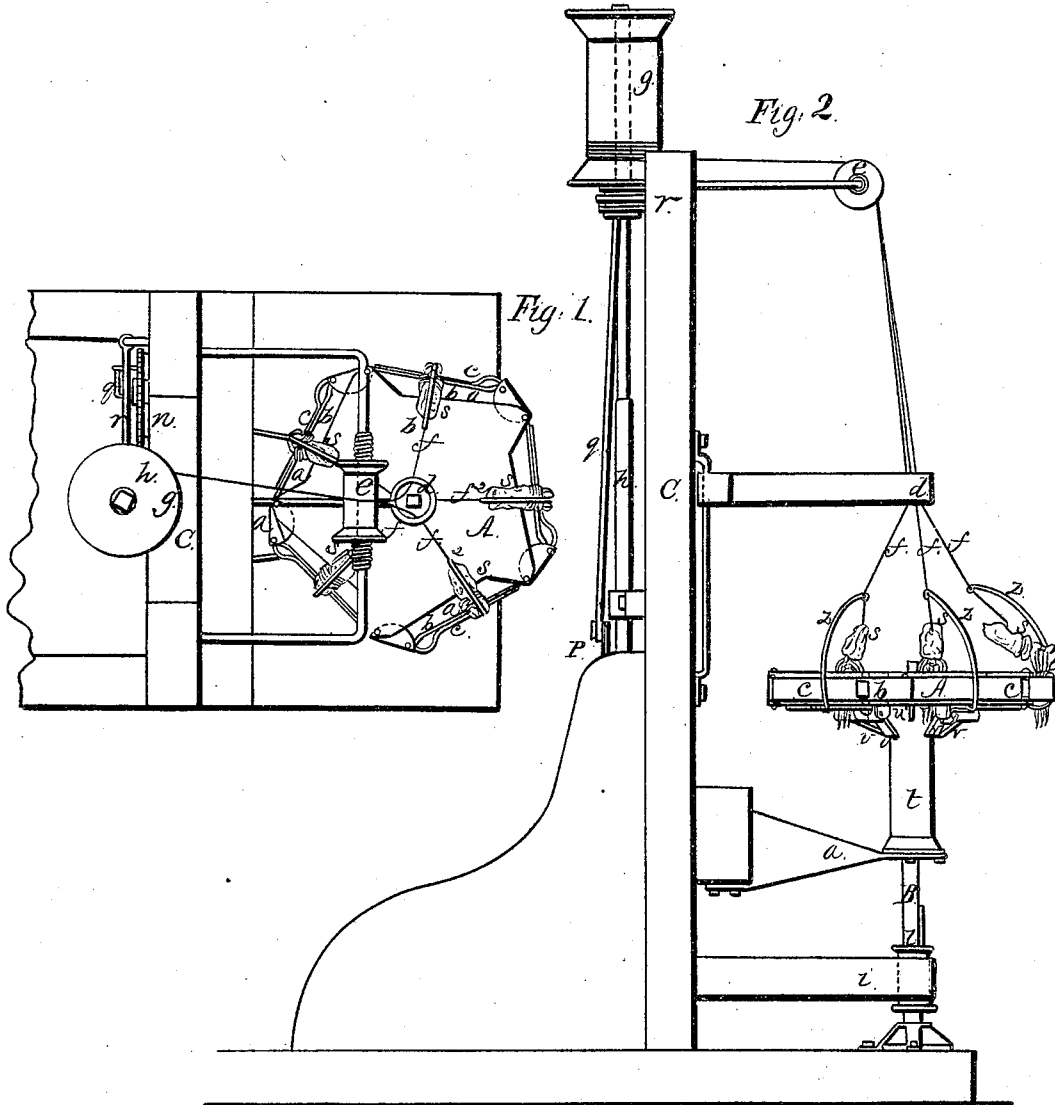


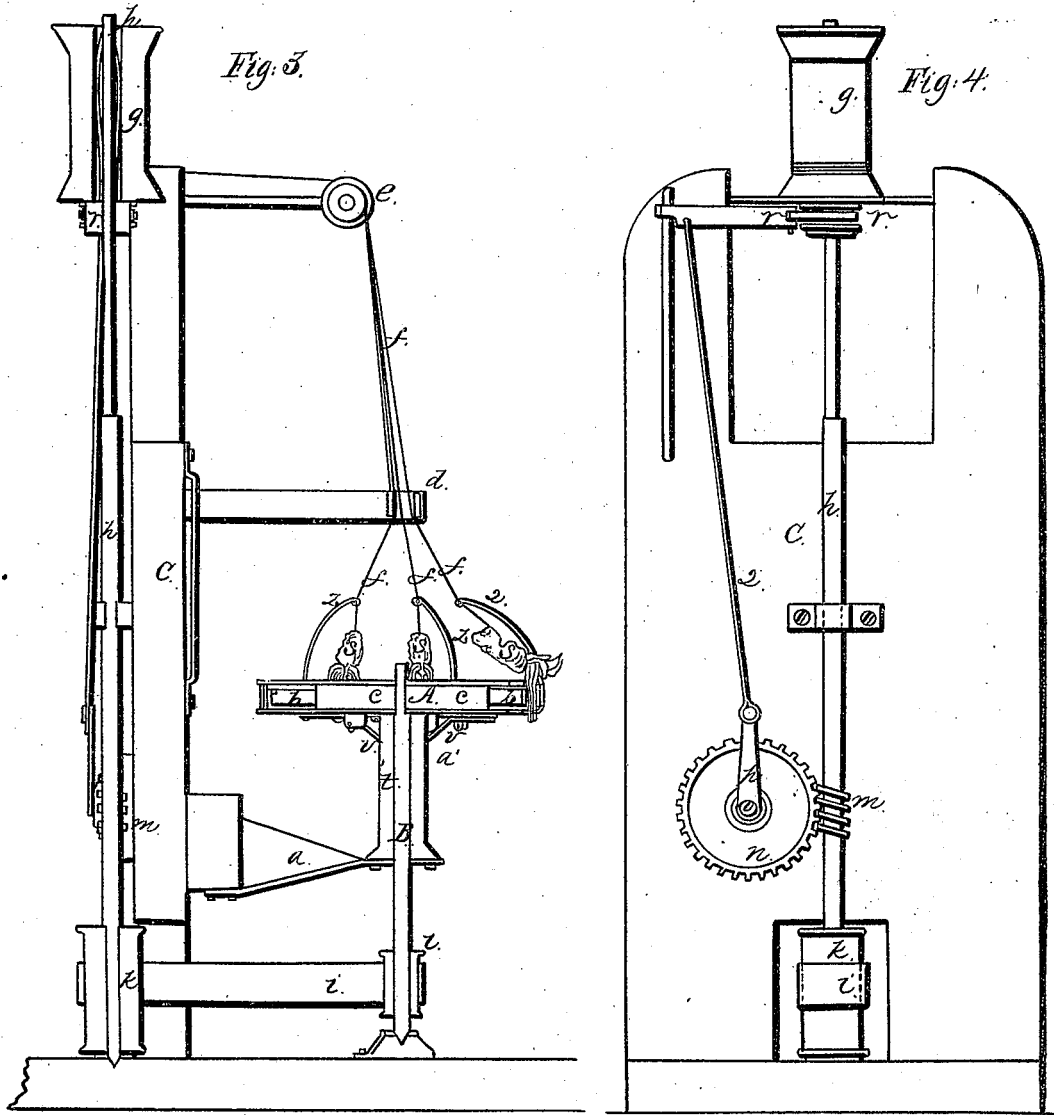
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Mode of Producing Silk from Insects.
N^o 51,988. Patented Jan. 9, 1866.



Witnesses:
D. J. Hale Jr
G. H. Washburn

Inventors:
B. G. Wilder, S. Wales and William Nichols
By their Attorney,
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UNITED STATES PATENT OFFICE.

B. G. WILDER AND S. WALES; OF UNITED STATES ARMY, AND WM. NICHOLS,
OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN MODES OF OBTAINING SILK FROM LIVING SPIDERS AND OTHER SILK-PRODUCERS.

Specification forming part of Letters Patent No. 51,988, dated January 9, 1866.

To all whom it may concern:

Be it known that we, BURT G. WILDER and SIGOURNEY WALES, of the Army of the United States, and WILLIAM NICHOLS, of Boston, in the county of Suffolk and State of Massachusetts, have made a new and useful invention having reference to Obtaining Silk or a Fibrous Material from Worms or Insects or other Silk-Producing; and we do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a top view, Fig. 2 a side elevation, Fig. 3 a vertical section, and Fig. 4 a rear view of an apparatus which may be employed in carrying out our invention.

We would remark, by way of preamble, that one of us—viz., said BURT G. WILDER, (who is an assistant surgeon of the Fifty-fifth Massachusetts regiment, now in the service of the United States Government,) while stationed on Folly Island, off the State of South Carolina, in August, A. D., 1863—caught a medium-sized field spider, which was found afterward to be nearly, if not quite, identical with the *Nephila plumipes*, described and figured by Koch in his "Araneides," volume 6, of which he says but a single specimen was brought from Louisiana, and is in the collection of J. Sturm, of Nürnberg. Observing that the silk extracted from this spider had a beautiful golden color and luster, that it could be easily drawn from the insect, which at the time evinced a great degree of quietude under the operation, there was extracted from him, for the space of one hour and a quarter, at the rate of six feet per minute, a filament or thread of about one hundred and fifty yards in length, the weight of which was found to be one-third of a grain. Subsequently another of us—viz., the aforesaid SIGOURNEY WALES, who was major of the regiment, discovered great numbers of the particular spider in question on Long Island, adjoining Folly Island, and easily procured therefrom several thousand yards of the silk. The beautiful appearance and strength of the silk obtained from these spiders and the large number of them found at the said localities induced us to devise some practical method of obtaining the silk. The spider appears to be harmless, can be easily handled,

and after having had the silk extracted will recuperate in the course of some ten or fifteen days, so as to be capable of being used again for the purpose.

We have reason to believe that by means of our discovery of the silk-producing property of this spider, and by our means or mode of obtaining such silk from it while alive, we have initiated a branch of industry the results of which to our country and to the world may be of great importance.

We believe that our mode of obtaining the silk may also be employed in getting it from the common silk-worm, rather than by the usual process of reeling it from the cocoons made by such silk-worm, and also that it is equally applicable to many other silk-producers.

In carrying out our invention we make use of a rotary wheel or frame, A, mounted on a spindle, B. The perimeter of this frame we provide with a series of notches, as shown at *a a a*, and around such perimeter we stretch an elastic band, *b*, of india-rubber. Where the band extends across each notch we provide the frame with a leaf-spring, *c*, to press against the band. This spring and elastic band serve to hold the spider by the legs, he being arranged with his body horizontal, or nearly so, and with his legs bent down between the spring and the band. Having thus fixed several spiders, *s s s*, or other silk-producers on the frame or about its perimeter, the silk-filaments *f f* from them are to be brought together and passed through an eye or guide, *d*, which may be so applied to a supporting-frame, C, as to be capable of being adjusted either nearer to or farther from the frame A. From this guide *d* the silk is to be led to and around a roller, *e*, and from thence to a spool, *g*, arranged on another spindle, *h*, applied to the rear part of the frame C. An endless belt, *i*, not only goes around a pulley, *k*, fixed on the spindle *h*, but also works around another pulley, *l*, fixed on the spindle B, so that when either spindle is set in revolution the other will be accordingly rotated.

An endless screw, *m*, fixed on the spindle *h*, engages with a worm-gear, *n*, from whose shaft *o* there projects an arm or crank, *p*. From the said crank a rod, *q*, extends to a slider, *r*, on

which the spool *g* rests. The object of the said screw *m*, worm-gear *n*, crank *p*, rod *q*, and slider *r* is to elevate the spool so as to cause it to wind upon itself, the thread in regular helices.

The spindle B extends through a stationary standard, *t*, supported by a bracket, *u*, arranged as shown in the drawings. From the upper part of the said standard *t* a series of teeth, *u'*, project radially, they being to cooperate with a series of levers, *v v*, applied to the under side of the frame A. A wire, *z*, having a helical eye at its upper end, extends from each lever, and with respect to one of the spindles, in manner as shown in the drawings, the thread from the spider being led through the said eye before being carried up to and through the guide *d*.

While the machine may be in operation and the threads remain whole or unbroken they will maintain the inner arms of the several levers below the teeth *u'*, but should a thread from any one of the spiders become broken, the arm of the lever upheld by such thread will drop and throw its other arm up between the teeth, and so as to cause a stoppage of rotation of the frame or wheel A. Thus the machine will be stopped in its action whenever a breakage of a thread may take place or the thread may cease to flow from any one of the spiders. The long legs and large body of the peculiar spider in question render these insects very easy to be handled and managed. They do not evince a disposition to bite a person or one another. Until our observation of this spider and its habits, it appears to have been but little known or understood.

Heretofore attempts have been made to obtain silk from spiders by taking it from their little cocoons or egg-bags, but this silk could only be carded after having been cleaned; but all such attempts, so far as we are aware, have been failures in a practical point of view, both on account of the nature of the silk and the difficulty of procuring and keeping the spiders, the common house-spider being that used.

They are so furious that they will destroy one another when kept together in large numbers. This is not the case, however, with the field-spider of the kind found on the sea islands of South Carolina, the silk from which is superior to that obtained from the silk-worm. We draw and reel the silk directly from the spider, and generally at the rate at which the spider usually drops from an object to the ground. The silk is dry, free from all gum or impurity, and at once fit to be made into thread. A strand from the insect is about one four-thousandth of an inch in diameter, and will bear a weight of about fifty grains before breaking. Four or five of such strands come from one of the spiders at once.

We would remark that we have contemplated the drawing of the silk from the spider or spiders and twisting each strand before the several strands are twisted together into one thread. In accomplishing this the insects may be held stationary, and a spring apparatus may be used which will not only draw the silk from one or more of them and twist it at the same time, but twist several of the strands into one; or, instead of the spiders being stationary, they may be applied on separate wheels, each to revolve, or they may be applied to a series of such wheels, and they may revolve not only on their own axes but around a common axis.

What we claim as our invention is—

1. The drawing and reeling or winding the silk directly from insects, spiders, silk-worms, or other silk-producers, as set forth.

2. The drawing, reeling, and spinning or twisting together directly from the bodies of insects, spiders, silk-worms, or other silk-producers two or more strands or threads, as set forth.

BURT G. WILDER.
SIGOURNEY WALES.
WM. NICHOLS.

Witnesses:

GEO. W. CLARK,
J. M. CLARK.