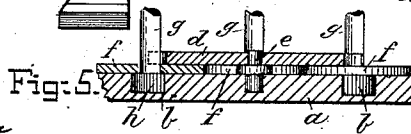
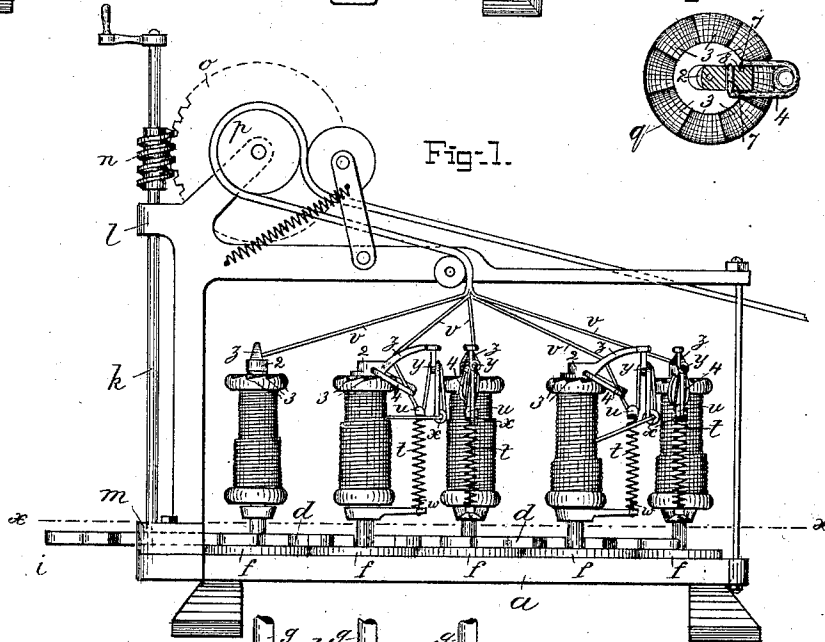
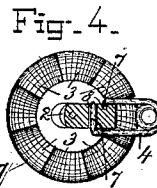
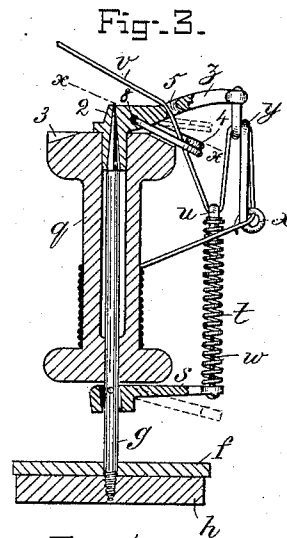
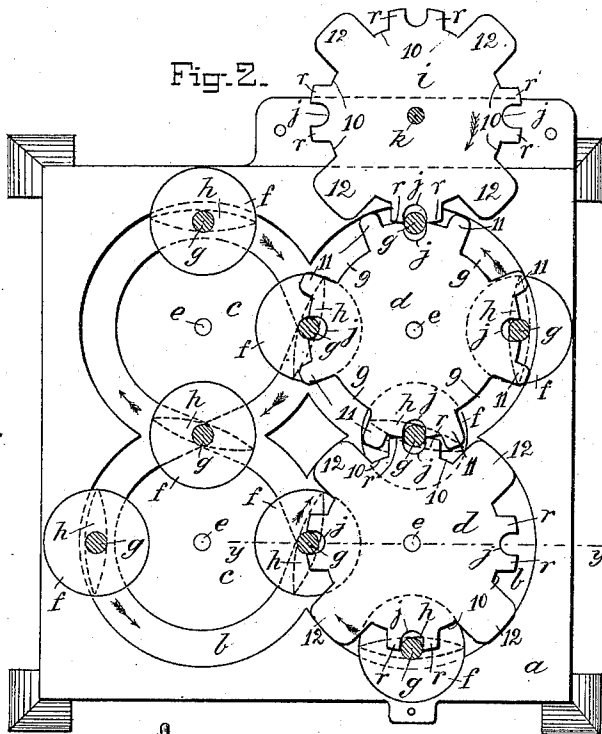


(No Model.)

A. FORNANDER.
BRAIDING MACHINE.

No. 468,649.

Patented Feb. 9, 1892.



WITNESSES:
Ernst Lundgren
O. J. H. Morgan

INVENTOR.
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By A. P. Thayer.
Att'y

UNITED STATES PATENT OFFICE.

ALFRED FORNANDER, OF NEW YORK, N. Y., ASSIGNOR OF ONE-FOURTH TO
THOMAS W. RIDSDALE, OF SAME PLACE.

BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 468,649, dated February 9, 1892.

Application filed February 2, 1891. Serial No. 379,868. (No model.)

To all whom it may concern:

Be it known that I, ALFRED FORNANDER, a citizen of Sweden, and a resident of New York city, in the county and State of New York, have invented new and useful Improvements in Braiding-Machines, of which the following is a specification.

My invention consists in various improvements in the construction of braiding-machines, whereby it is designed to provide simpler, cheaper, and at the same time more efficient and easier-running machines, all as hereinafter fully described, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of the machine as seen looking toward the left-hand side of Fig. 2. Fig. 2 is a horizontal section on line *x x*, Fig. 1. Fig. 3 is a vertical section of a bobbin and its carrier and some of its adjuncts and a side elevation of some of the parts. Fig. 4 is a detail in section on line *x x*, Fig. 3; and Fig. 5 is a detail in section on line *y y*, Fig. 2.

I make the bed-plate *a* with the guiding-grooves *b* for the guide-runners of the bobbin-carrying spindles in its upper surface, preferably producing the grooves by milling or casting them in the plate, and I construct the bobbin-drivers *d* with teeth, adapting them for the driving-gears also, and mount said drivers on stud-pivots *e* a suitable distance above the surface of the plate for the heads *f* of the bobbin-carrying spindles *g* to run between said plate and drivers, so that the heads project on one side into the space between the bed-plate and the drivers for holding the spindles upright as they move along their courses.

The guide-runners *h* are attached to and project from the lower sides of the spindle-heads *f* into the guide-grooves, and thus the spindles are operated with the driver and only one plate and the spindles have only a single head and the drivers are geared with a main driving-wheel *i*, gearing into one of them, while in the common arrangement the drivers are supported above the bed-plate and geared by independent gear-wheels below them and a special cam-plate is mounted above the drivers, and the spindles necessa-

rily have two heads to keep them upright, one above and one below the cam-plate, which, it will be seen, is more complicated and expensive to construct and productive of greater friction.

To adapt the bobbin-carrier drivers *d* for the driving-gears also, I make them with suitable gear-teeth between the parts *r*, terminating in the pitch-line and having the notches *j*, which engage the spindles *g*, said teeth suitably meshing for turning one driver by another and for gearing with the main driver *i*, thus avoiding the complication and expense of separate driving-gears.

Besides the advantage of the geared bobbin-carrying drivers due to their double function, the teeth, projecting beyond the pitch-line, overlap the heads of the carrying-spindles to a greater extent than if not so geared and hold the spindles upright more securely and with less friction when passing outside of the drivers, where the lateral pull on the spindles is greater, and I find it to advantage to make a tooth 12 in one wheel intermediate to the driving-notches of much greater length and breadth than the rest, with corresponding notches 9 in the mate wheel, which larger teeth overlap said heads to a greater extent when entering between the wheels, where the direction of the pull of the cord on the spindles is not so well resisted by the parts of the heads extending under the drivers. The drivers are mounted simply and cheaply on the studs *e*, set upright in the plate *a* centrally to the grooves *b*. The main driver is mounted on the driving-shaft *k*, set upright in the bearings *l m* and near its upper end gearing, by the worm *n* and wheel *o*, with the take-up roll *p*. For the cord tension, let-off, and guide and for the faller-rod for releasing the belt-shifter to stop the machine when a cord breaks I provide the faller rod or arm *s* on the spindle *g*, where it serves for the seat of the lower end of the bobbin, and so pivoted to the spindle that it will swing downward when not supported at the outer end with the coiled tension-spring *t*, connected to and extending upward from said outer end parallel with the bobbin and to a suitable height carrying at its upper end the eye *u* for the cord *v*, said faller-rod having a suitable stud-

pin *w*, projecting upward within the coils of the spring to keep it in an upright position, or practically so, when the cord is not strung in the eye *u* of the upper end of said spring, the swing of the faller being limited by the shoulders of its hole for the spindle. The wire containing the guide-eye *x* for leading the cord from the bobbin and the guide-eye *y*, through which the cord runs from said leading-guide to the eye of the tension-spring, is suspended from the arm *z*, projecting over the top of the bobbin from the top of the spindle *g*, on which the socketed hub 2 of the arm is detachably seated, said hub extending into the bore of the bobbin and forming the upper bearing, on which the bobbin turns when letting off the cord, the lower bearing of the bobbin being directly on the spindle.

The bobbin has ratchet-notches 3 on the top for controlling the let-off of the cord by a pawl 4, through the free end of which the cord passes between the eye in the tension-spring and an eye 5 in the arm *z*, from which it goes into the braid. The cross-section of the point of the spindle on which the hub of arm *z* rests and of the socket of said hub are angular, so that the arm is incapable of rotating on the spindle, and said arm and the faller-rod are applied to and maintained on the spindle in the same plane. It will now be seen that when the tension of the cord stretches the spring *t* to a certain height the pawl 4 will thereby be lifted out of the notch of the head of the bobbin and the bobbin will rotate and let off more cord, which thus being let free will lessen the tension and the spring will again pull down the cord and again let the pawl drop into a notch of the bobbin and hold it until released again in like manner.

The pawl 4 consists of a yoke of wire having the pivot ends 7 projecting inward in different lines in a plane of the yoke and inserted in pivot-holes 8 so placed in the arm *z* that the pivots and holes normally coincide when the pawl rests in the notches, as shown in Figs. 3 and 4, which causes slight torsion on the members of the yoke when raised by the cord and causes a delicate spring-pressure, thrusting the pawl downward gently when raised by the cord and adding a slight force to the gravity of the pawl for returning it into the notches, such as would otherwise require an additional spring. This is important in order that too much tension be not added to that of the main spring *t*.

The eyes *x* and *y* are formed in coils of the wire, into which the cord can be threaded by pressing it between the parts of the coils where they cross more readily than the cord can be threaded lengthwise through a solid eye.

The faller arm or rod *s* will be connected with the tripper of the belt-shifter in any of the well-known ways of such devices, which it is not necessary to show.

I claim—

1. In a braiding-machine, the combination

of a bed-plate or table having the cam or guiding grooves formed in it, bobbin-carriers having the disk-head resting on the table and the guiding-tongue on the under side of said head and running in the grooves, and the bobbin-carrier-drivers next above and overlapping the said heads and confining the heads of the bobbin-carriers on the table and the tongues in the grooves, substantially as described.

2. In a braiding-machine, the combination of the bed-plate or table having the guide-grooves for the bobbin-carriers formed on it, the drivers for the carriers, supported above said plate, the bobbin-carriers having the head running between said drivers and plate, and the guiding-tongue projecting from the head into the groove, substantially as described.

3. The combination, with the bobbin-spindle, faller-arm pivoted on the spindle, cord-guides, supporting-arm for said guides, also supported on the spindle, and the let-off pawl pivoted on said arm, of the tension-spring attached to the faller-arm and extending upward and having a guide-eye for the cord in its upper end, said guide-eye being below the guide-supporting arm and the let-off pawl and intermediate to the latter, and the upper guide-eye supported by the said arm, substantially as described.

4. The combination, with the bobbin-carrying spindle, of the guide-supporting arm mounted on the top of the spindle and the guide-wire pendent therefrom, having the leading guide-eye *x* and the guide-eye *y*, above the guide-eye *x* formed therein, substantially as described.

5. The combination, with the spindle, guide-supporting arm supported on the top of the spindle, and the tension-spring under the guide-supporting arm, of the let-off pawl consisting of the wire yoke pivoted in said arm near its support on the spindle and over the ratchet-head of the bobbin and with its bow in range of the tension-spring and having its pivots in the different lines adapted to produce tension for returning the pawl when raised by the tension-spring to release the bobbin, substantially as described.

6. In a braiding-machine, the combination of the bed-plate or table having the guide-grooves for the bobbin-carriers formed in it, the drivers for the carriers, supported above said plate, and the bobbin-carriers having the head running between said drivers and plate, said drivers having intermeshing teeth overlapping the heads of the carrier, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 27th day of January, 1891.

ALFRED FORNANDER.

Witnesses:

W. J. MORGAN,
W. B. EARLL.