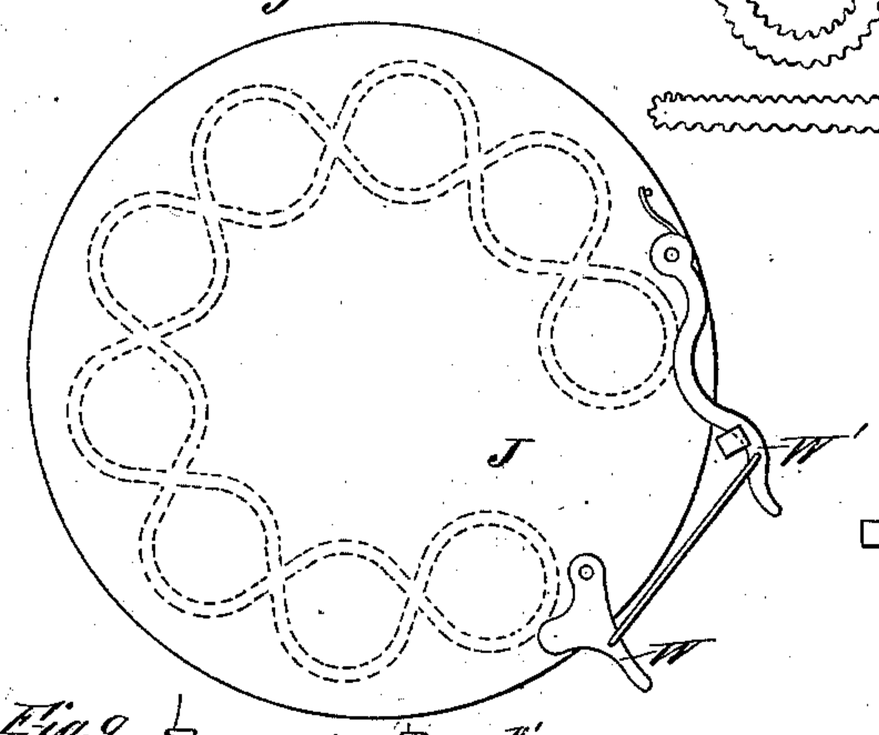
2 Sheets—Sheet 1.

N. JENKINS.

BRAIDING MACHINE.

No. 254,822 Patented Mar. 14, 1882.

Fig. 1.



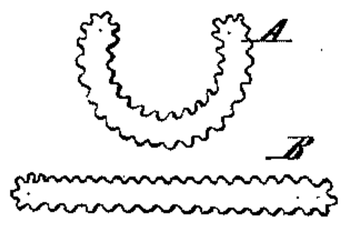


Fig. 2.

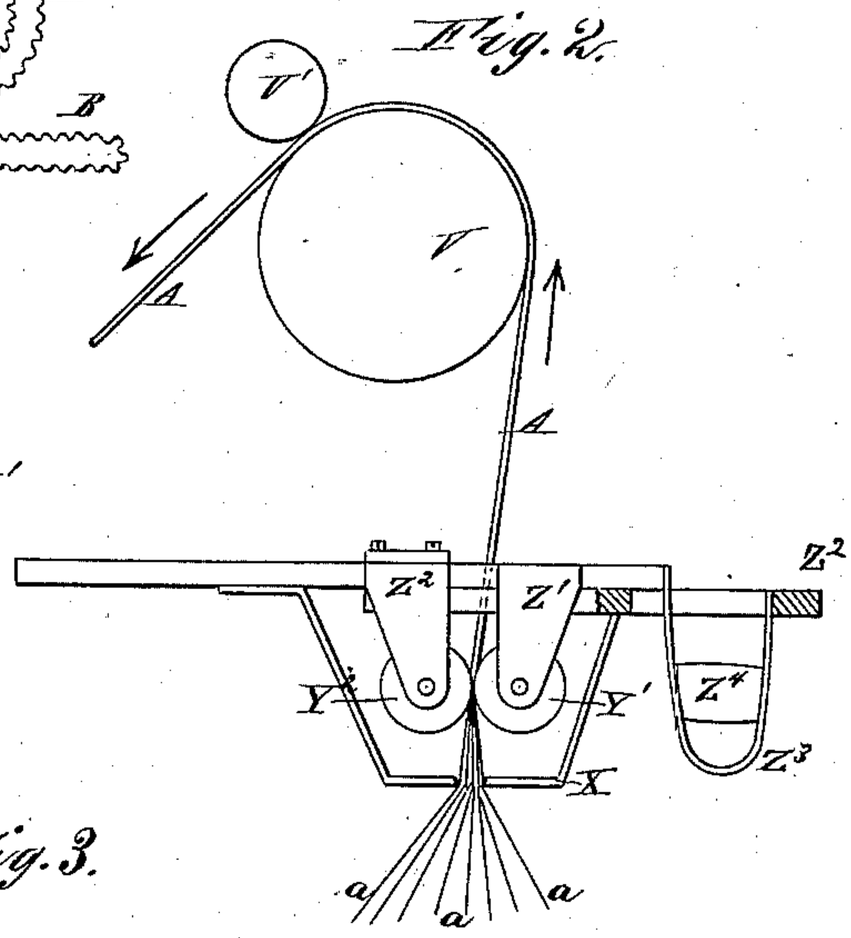


Fig. 9.

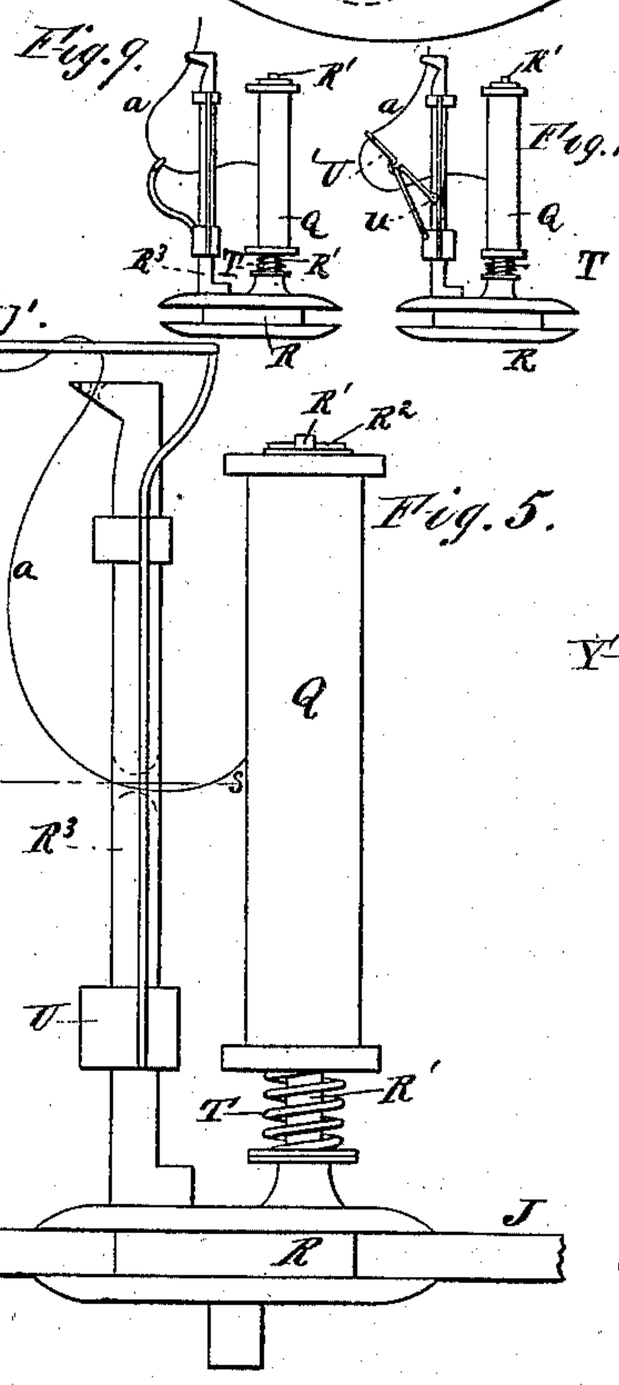


Fig. 10.

Fig. 3.

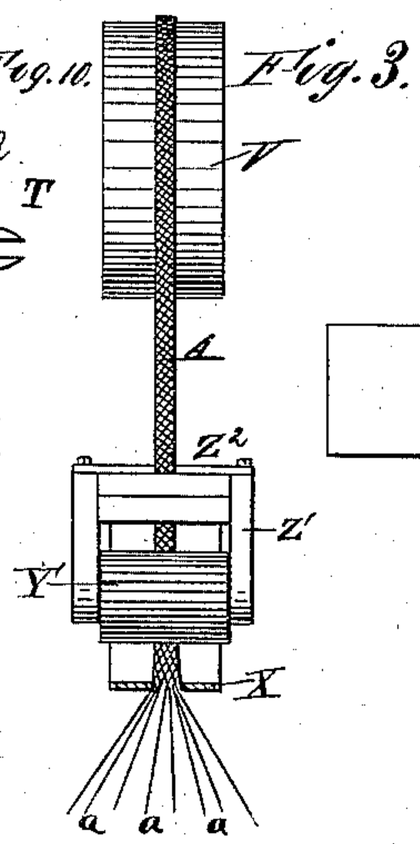


Fig. 4.

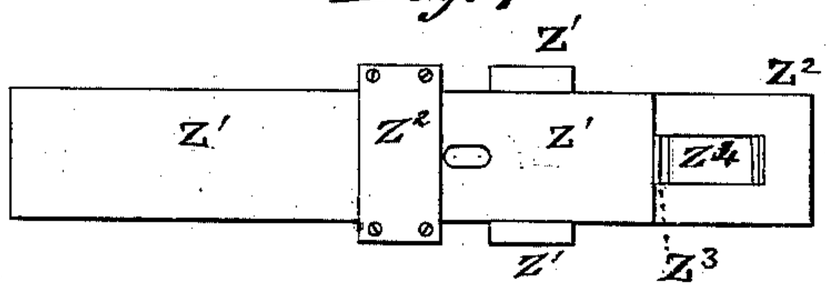


Fig. 5.

Fig. 6.

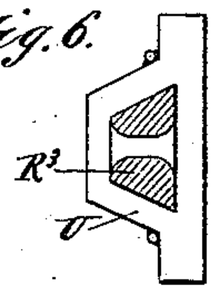


Fig. 8.

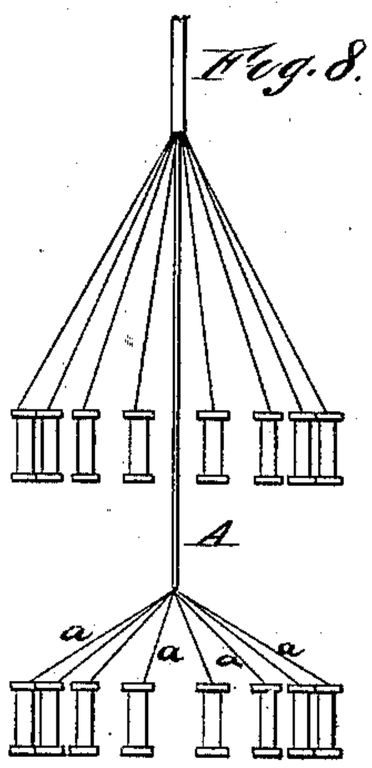
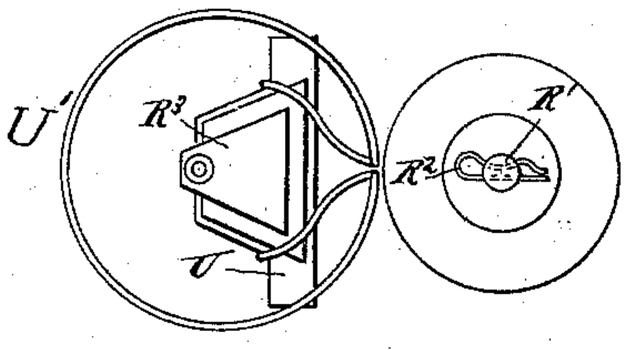


Fig. 7.



WITNESSES

J. M. Read

H. Clay Smith Jr.

INVENTOR

Nicholas Jenkins

by his attorney

Thomas D. Stetson

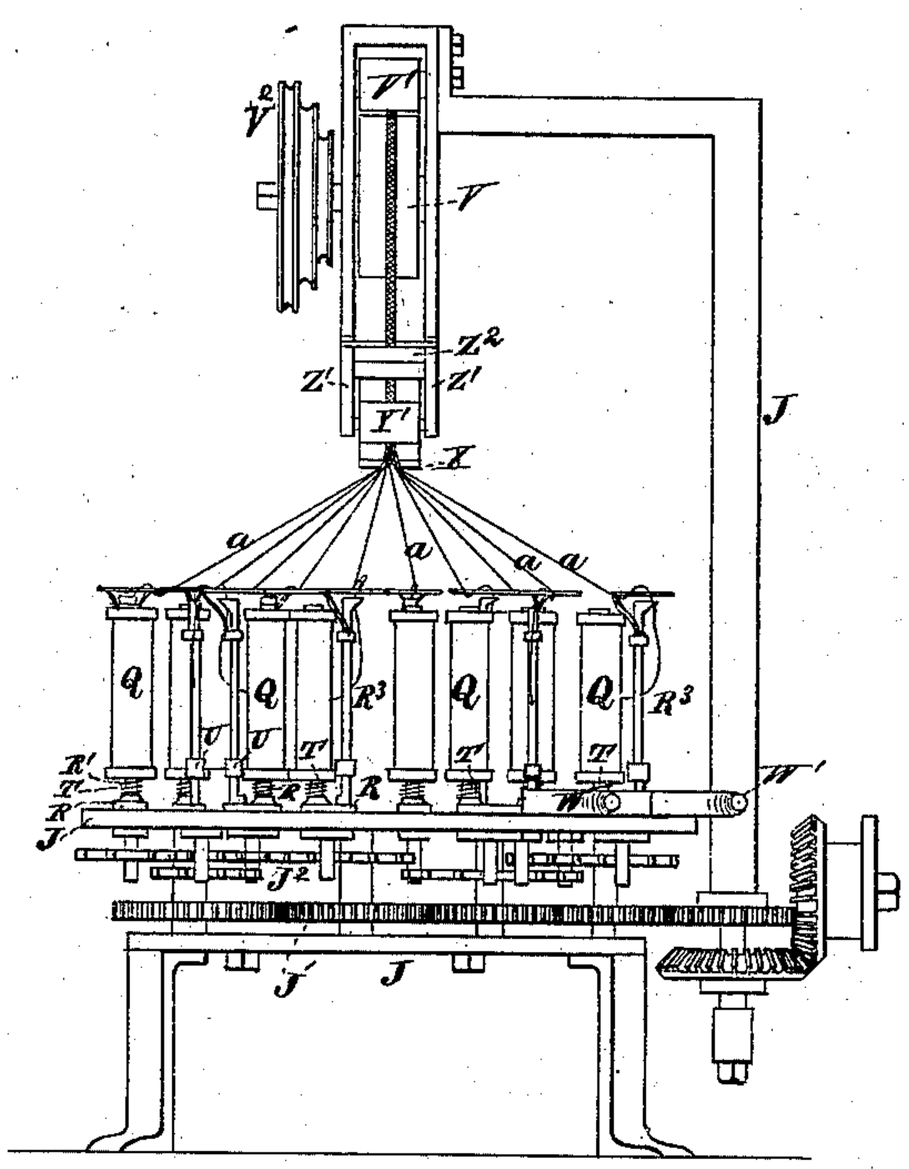
2 Sheets—Sheet 2.

N. JENKINS.

BRAIDING MACHINE.

No. 254,822. Patented Mar. 14, 1882.

Fig. 11.



WITNESSES

Charles R. Searle.

Edw. D. Stafford

INVENTOR

Nicholas Jenkins

by his attorney F. C. Dodson

UNITED STATES PATENT OFFICE.

NICHOLAS JENKINS, OF NEW HAVEN, CONNECTICUT.

BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 254,822, dated March 14, 1882.

Application filed February 26, 1880.

To all whom it may concern:

Be it known that I, NICHOLAS JENKINS, a citizen of the United States, residing in the city and county of New Haven, State of Connecticut, have invented certain new and useful Improvements Relating to Braiding-Machines, of which the following is a specification.

The object of the invention is to better adapt the machine for braiding material having considerable stiffness. It is more particularly intended for braiding wires of hard brass or steel to be used as springs in corsets and for other uses.

The ordinary braiding-machine used in producing flat braid from fibrous yarns can be used to make corresponding braid from hard elastic wires; but there are difficulties in working such machines which my invention is intended to avoid. In other words, my invention applies to braiding-machines to adapt them for working wire. Hard brass wire No. 26, drawn down from No. 18 without annealing, can be wound on spools and carried in a braiding-machine and delivered through guides and formed into braids; but a greater than usual and very reliable tension must be employed. I produce this tension by the friction induced by a sufficiently strong spiral spring. I have mounted such a spring below each bobbin or spool, so that it presses the latter up against a transverse pin or other reliable stop above. There may be washers between. The upper stop may be an adjustable nut with a jam-nut to allow of screwing down or up, as required, to delicately adjust the force. Another difficulty met with in working wire is the tendency of the hard metallic braid to assume a guttered or trough-like form. The fibrous yarns are applied together in that position in the manufacture of ordinary flat braid; but the softness and flexibility of that material allow it to flatten. Hard wires, on the contrary, are not easily changed in condition after the goods are completed. I surmount the difficulty by avoiding the cause. I so guide the wires that they are braided together in a flat condition. I prefer to employ rollers as guides to hold the material in a flat condition while in process of formation, and I esteem it preferable to mount the rollers on slides. The perfected form of this portion of the invention is developed in a pair of rollers, mounted in yielding bearings and pressing against the two faces of the flat braid as the wires are combined in the act of forming the braid. Another difficulty lies in the liability of the stiff material to hold up the ordinary weight, which serves as a stop-motion, when it ought to fall. It is important that the machine shall stop if a strand is broken by any chance. I have devised a stop-motion which, while guiding the weight reliably on the upright rod which serves as a guide for the strand, so as to allow the rapid serpentine motion required, devolves its weight on the wire between the guide and the braiding-point. This position allows a slight weight to depress the free end, even of a highly elastic wire, so soon as a break occurs.

I can use my improved braiding-machine in combination with a common braiding-machine so that the latter shall apply a covering of yarn after my machine has properly braided the hard wires. I propose to thus operate whenever I desire my springs to be covered, though I can cover by a separate operation, if desired, in any case.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a plan view of the ordinary track in which the carriers are traversed by the ordinary mechanism, with the ordinary stop-motion levers ready to be actuated by the stop as soon as it falls on the breaking of a strand. So far the machine in no wise differs from the ordinary flat-braiding or tape-braiding machine. The diagram A shows the trough-like condition in which the goods tend to be formed by the motion of the carriers if the wires are unguided. The diagram B shows the flat condition in which the goods are produced by the aid of my improvements. Fig. 2 is a side elevation, partly in section. This figure shows the means for inducing a flat condition of the braid in the act of manufacture, with so much of the other parts as is necessary to show its relation thereto. Fig. 3 is a detail sectional elevation, showing some of the parts at right angles to the view shown in Fig. 2. Fig. 4 is a plan view of the parts which hold and press

together the rollers shown in Fig. 2. Fig. 5 is an elevation of one of the spool-carriers, with the upright guide and stop-weight. Fig. 6 is a horizontal section on the line S S in Fig. 5. Fig. 7 is a top view of the spool-carrier. Fig. 8 will be described farther on. Figs. 9 and 10 will also be described farther on. Fig. 11 is a view of the entire view.

Similar letters of reference indicate like parts in all the figures.

The drawings represent the novel parts with so much of the fixed frame-work and other ordinary parts as is necessary to indicate their relations.

J is the fixed frame-work. R are the carriers, traversed in the grooves therein, in the ordinary manner, by means of gearing $J' J^2$ under the upper table. R′ is the upright rod on each carrier, the ordinary dead-spindle for the bobbin. R^2 in Figs. 5 and 7 is a transverse pin set therein.

Q are bobbins, filled with hard brass wire, mounted loosely on the rods R′; and T are coiled springs, exerting considerable upward pressure on the lower end of the bobbins Q, forcing them tightly against the pins R^2. An upright, R^3, on each carrier serves as a guide for the wire *a*, and also for a weight, U, as will appear farther on. Each wire *a* is delivered from the bobbin Q at the proper tension horizontally through a hole at the mid-height in the upright R^3, and thence upward through a hole in the top of said upright, from whence it is led away to be properly braided with the other wires.

U is a weight embracing the upright R^3 and formed at the top in a nearly complete circle, U′, which rests on the wire *a* after it has passed the second guide-hole in the rod R^3. The weight U U′ bears on the wire *a* at a point where it is entirely incapable of supporting it by its stiffness alone. The wire can only support the weight U U′ by its tension in being drawn under considerable resistance from the upper guide-hole to the braiding-point. When the wire *a* breaks the free end is sure to be depressed by the gravity of the weight U U′, and on the latter falling it touches one of the levers W or W′ so soon as the movement has brought it around to that point, and, acting through it on an ordinary stop mechanism—such as that shown in Patent No. 57,326 to Howe and Mackrell, August 21, 1866—stops the machine.

It will be understood that, like ordinary stop-motions in this class of machines, the weight U U′ passes over the levers W W′ and produces no effect so long as the wire *a* is intact.

The several wires *a* delivered from the several guides R^3 past their several stop-weights U U′ are brought together through a fixed guide formed by a liberal aperture in a fixed piece of sheet metal, X. This insures that the wires are approximately together as they pass up between a pair of rolls, $Y' Y^2$. These rolls are mounted in separate holders $Z' Z^2$. The holder Z′ is mounted on the fixed frame represented in Fig. 11. It is stationary. The holder Z^2 is movable on the holder Z′. It is controlled by a metal spring, Z^3, re-enforced by a rubber spring, Z^4, embraced therein. By adjusting the latter up and down in the wedge-like space within the metal spring Z^3, I can adjust the tension or force with which the rollers $Y' Y^2$ are pressed together.

I so mount the holders $Z' Z^2$ that the bite or point of contact of the rollers $Y' Y^2$ will stand just at the level where the several wires *a* are braided together—in other words, at the point where the wires assume the united condition of a braid. As the rollers $Y' Y^2$ are cylindrical rollers, the braid formed in the narrow space between them is correspondingly plane, and retains a flat condition as it is carried up and over the delivering-roller V and under the pressure-roller V′ to be led away and wound on a proper spool. (Not represented.)

The roller V is operated by means of a cone-pulley, V^2, by a belt from a power not shown.

I may remark generally of the braided wire springs that when the take-up of the braiding-machine is operated slowly relatively to the braiding motion of the carriers R and their attachments the wires are applied together at a great angle and the spring is elastic longitudinally or tensionally, as is required for garters and analogous articles, and that when the take-up is worked rapidly, with no increase in the motion of the braiding mechanism, so that the wires are applied together at a small angle—nearly parallel to each other—the braid has little or no elasticity lengthwise or tensionwise, but is peculiarly well adapted to serve elastically by flexure or bending, as is required by stiffeners in corsets, bustles, &c. Stretching is not required or desired in stiffeners. I propose in some instances to prevent the possibility of tensional elasticity in stiffeners by introducing one or more straight longitudinal wires within the braid.

My carriers R and their attachments are shown in Fig. 11 as worked by the ordinary gearing employed in moving the bobbin-carriers of ordinary braiding-machines.

The advantage due to my employment of the two stop-levers W W′, connected as shown, is that the mechanism will be stopped by a carrier on its approach to either end of its traverse after the weight U U′ has fallen.

Fig. 8 is a diagram showing the relation of two braiding-machines to make the covered springs, the lowermost carrying the wires and braiding them together to produce the spring and the uppermost carrying yarns of cotton, linen, worsted, or other material to be thus applied as covering. The different angles at which the strands converge are due to a difference in the rate of their braiding motion, because the take-up is necessarily uniform for each. The wires are braided at a greater angle with the axis of the finished spring than the covering yarns. It follows from this relation

that when from any cause this covered spring is exposed to a tensile strain the covering yarns are straightened first and serve as a check to arrest the tensional yielding of the wires. Such a spring is efficiently guarded by its covering against any undesirable stretching.

Modifications may be made in the form and proportions of all the details. Instead of making the weight of the stop-motion bear on the wire *a* at a point above the upper guide-hole, as shown, I can make it bear below the upper guide-hole, but off at a corresponding distance from the guide. This may be done either by a direct connection or indirectly through a lever. Figs. 9 and 10 are outlines representing these two modifications. Fig. 9 represents a modification in which the stop-weight U is made to depend on the wire *a* at a point wide off from the guide R^3, near the level of the lower guide-hole. The connection is direct, but differs from the ordinary stop-motions used on yarn-braiding machines in the fact that the bearing-point is distant from the guide R^3, so that the stiffness alone of the wire when the tension is removed by its breakage cannot hold up the weight. Fig. 10 represents a further modification, in which the weight is made to depend on the wire at or near the same point as in Fig. 9, and with the same effect; but instead of bearing directly on the wire it is made to do so through the medium of a lever, which turns on a center, *u*, pivoted on the guide R^3. The effect is the same with all these modifications. The breaking of the wire allows the weight U to fall by virtue of the weight being caused to bear at a point distant from the guide R^3.

I claim as my invention—

1. In a braiding machine, the combination, with the stop-levers W W′ and stop-weight U, having an attachment, U′, of the rod R^3, an ordinary or suitable carrier, R, and spindle R′, adapted to carry a bobbin, Q, the stop-weight being adapted to rest on the wire *a* after it has passed the guide-hole and at a distance from the guide, as and for the purposes set forth.

2. In a braiding-machine, the combination, with a series of bobbin-carriers, R, of framing J, having serpentine grooves in which the carriers are moved, carrying means J′ J^2, weights U, having the loops U′, and flattening rollers Y′ Y^2, arranged to guide the wires *a* at the point where they are braided together, so as to cause the braid to be produced in a plain condition, as herein specified.

3. In a braiding-machine, the spring Z^3 and adjusting means Z^4, in combination with the rollers Y′ Y^2, the carriers R, gearing J′ J^2, framing J, provided with serpentine paths, and suitable take-up mechanism, as set forth.

In testimony whereof I have hereunto set my hand, at New York city, N. Y., this 5th day of February, 1880, in the presence of two subscribing witnesses.

NICHOLAS JENKINS.

Witnesses:
BERN. T. VETTERLEIN,
CHARLES C. STETSON.