(No Model.) 3 Sheets—Sheet 1.

J. THOMAS.

BRAIDING MACHINE.

No. 457,171. Patented Aug. 4, 1891.

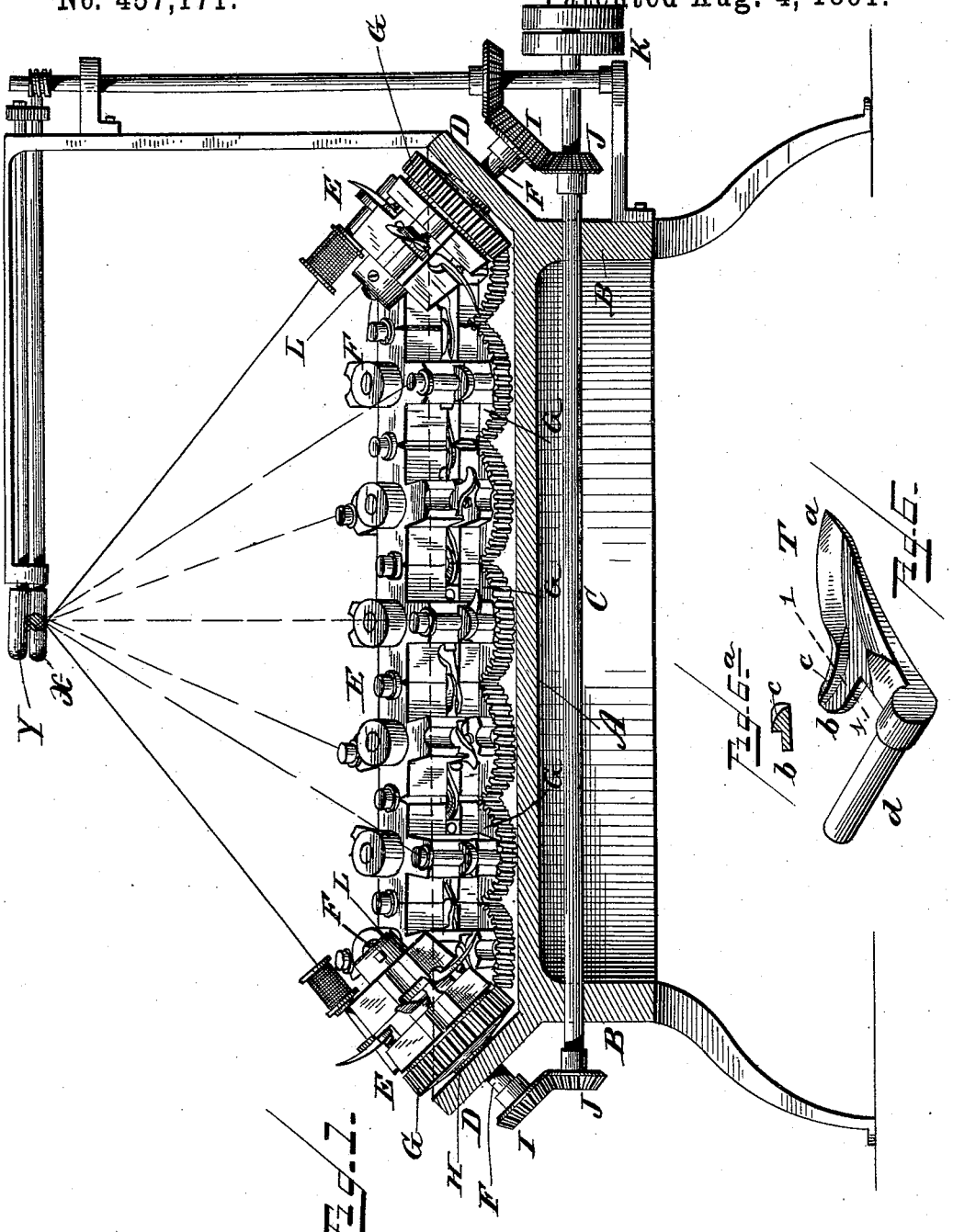


Fig. 1.

Fig. 5.

Fig. 5a.

Fig. 5b.

WITNESSES:
Frayck L. Ogrand.
Bennett Jones.

INVENTOR:
Joseph Thomas,
by Dawes Dagger & Co.
Attorneys.

(No Model.) 3 Sheets—Sheet 2.

J. THOMAS.

BRAIDING MACHINE.

No. 457,171. Patented Aug. 4, 1891.

Fig. 2.

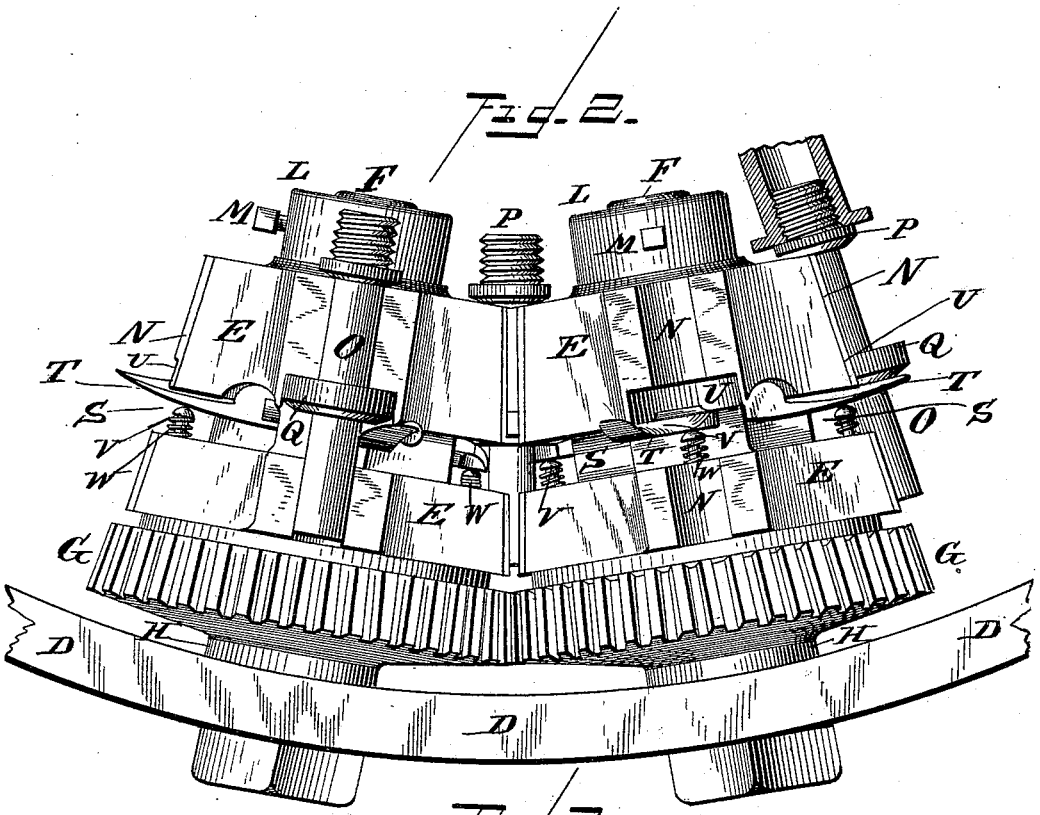
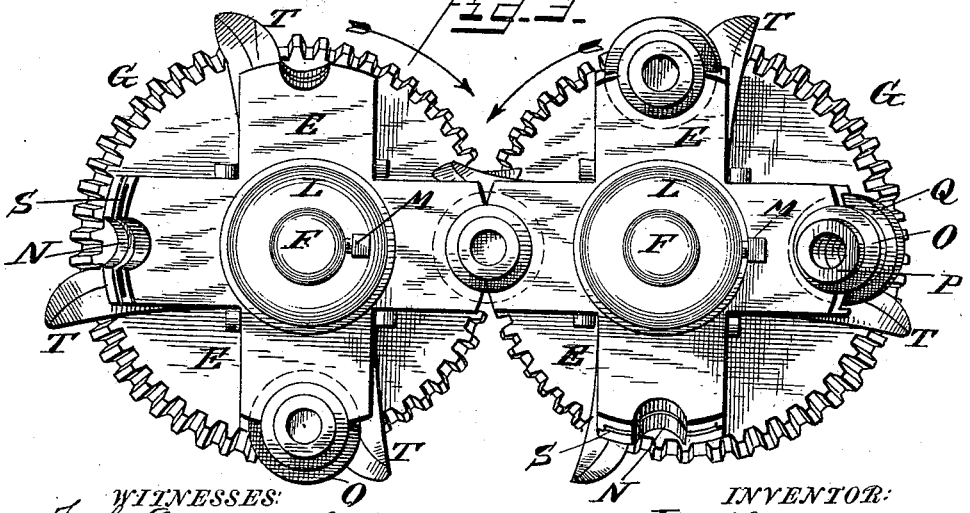


Fig. 3.



WITNESSES:
F. L. Durand.
Benn. H. Jones.

INVENTOR:
Joseph Thomas,
by Louis Bagger & Co.
Attorneys.

(No Model.) 3 Sheets—Sheet 3.

J. THOMAS.

BRAIDING MACHINE.

No. 457,171. Patented Aug. 4, 1891.

Fig. 4.

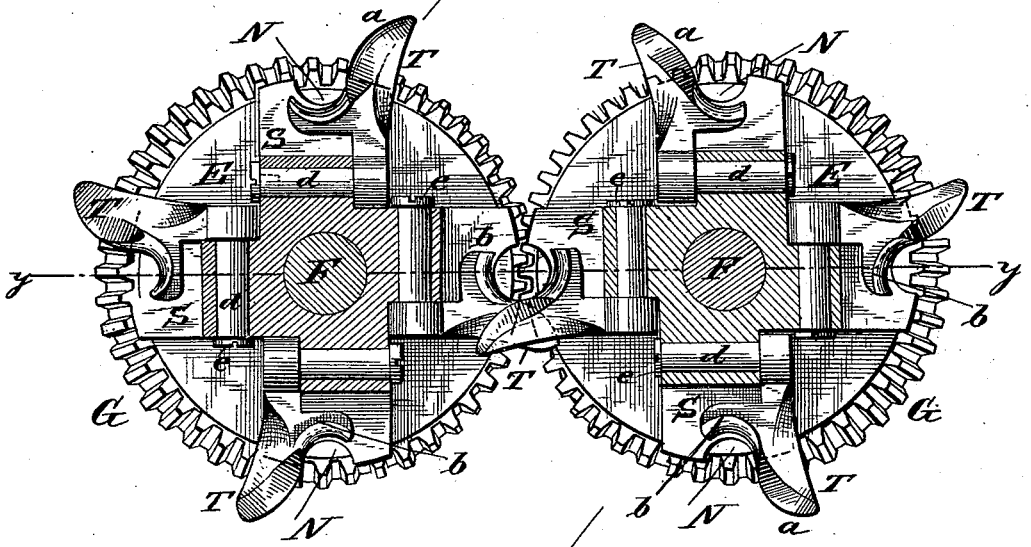
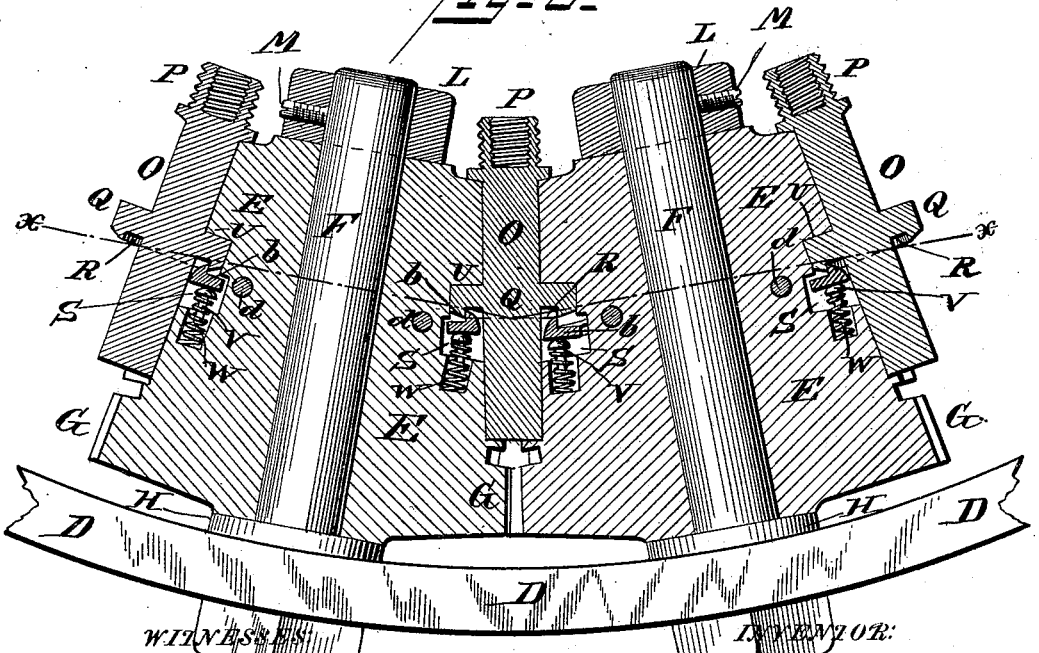


Fig. 5.



WITNESSES:

Franck L. Durand.

Emmett A. Jones.

INVENTOR:

Joseph Thomas,

by Munn & Dagger Co.,

Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH THOMAS, OF NEW YORK, N. Y.

BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 457,171, dated August 4, 1891.

Application filed January 26, 1891. Serial No. 379,070. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH THOMAS, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Braiding-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

In braiding and plaiting machines for the manufacture of flat, round, or tubular braid, or for covering an inner core (for example, an electrical conductor, a whip-stock, a flat spring, and numerous other articles) with braid, it is customary to employ a number of spools or bobbins, which are caused to run in a zigzag or "figure 8" course through a curved guide-track or race-course in such a manner as to intersect one another alternately, and thereby weave or plait the strands from the several spools into a continuous braid. In machines of this type as heretofore constructed, it has been found necessary to provide the spools with a tension device for taking up the slack of thread which occurs as each spool in passing over its figure 8 course at each zigzag movement approaches the center of the track, so as to produce an even tension on the threads at all times, irrespective of the distance of the spools from the center of the curved track in which they travel. Such tension devices, however, not only complicate the machine by adding to its parts, but involve loss of time and labor in their proper adjustment, besides which they are not always reliable.

The chief object of my present invention is therefore to so construct a braiding or plaiting machine that a tension device or devices may be entirely dispensed with; and another object is to simplify the construction and operation of the switching devices and carriers, whereby the spools or spool-holders, as the case may be, are switched from one carrier to another in their progress forward and back through the race-course.

A third object of my invention is to so construct the spools or spool-holders that these may be inserted into the carriers and again removed, as occasion requires, in a moment of time, and yet in such a manner as to be held firmly in place without shaking or oscillation as they progress through the track of the machine, even though this be operated at the highest possible speed.

With these several objects in view my invention consists in the improvements which will be hereinafter more fully described, and particularly pointed out in the claims.

Reference being had to the accompanying three sheets of drawings, Figure 1 is a sectional view of my improved braiding-machine on a vertical plane a little to one side of and parallel to the main driving-shaft. (Shown at C.) Fig. 2 is a detail view of two adjacent carriers with their appurtenances and spool-holders in proper operative position. Fig. 3 is a view of these carriers as they appear when looking toward them from the top. Fig. 4 is a horizontal sectional view of two adjacent carriers on the plane indicated by the broken line marked $x\ x$ in Fig. 5, the spool-holders having been removed. Fig. 5 is a sectional view through two adjacent carriers on the vertical plane indicated by line $y\ y$ in Fig. 4, and Fig. 6 is a perspective detail view of one of the hinged switching devices or latches removed from the carrier. Fig. 6^a is a section on the line 1 1, Fig. 6.

Like letters of reference denote corresponding parts in all the figures.

My improved machine is mounted upon the usual bed-plate A of circular or segmental shape, which is supported upon legs of convenient height. This bed-plate has on its under side depending bearings B for the main drive-shaft C, and is encircled on its upper side by an outwardly-flaring rim or flange D, set at an angle of about forty-five degrees, said flange D forming a circumferential support or bearing for the circularly-disposed revolving carriers shown at E, the shafts F of which are nutted (or otherwise firmly fastened) in the bearing-flange D in such a manner that said shafts will project inwardly and upwardly over the bed-plate A at angle of above forty-five degrees. Upon these fixed and stationary shafts F the carriers E revolve in alternately opposite directions propelled by their intermeshing gear-wheels G, as usual

in this class of machines, a washer H being interposed between the under side of each wheel and the flaring or inclined bearing D to reduce friction and prevent wear of the bearing.

Motion is imparted to the gears G by making two of the carriers of a slightly modified construction—viz., the two carriers located diametrically opposite to each other at opposite ends of the machine. As will be observed on reference to Fig. 1, the shafts F of these two carriers, instead of being fastened in the inclined rim or bearing D, project through the same and are provided on their projecting outer ends with bevel cog-wheels I. Instead of revolving upon their shafts these two carriers also revolve with their shafts, to which they are suitably fastened. Upon opposite ends of the horizontal drive-shaft C are fastened bevel-wheels J, which mesh with the cogged drive-wheels I, so that when shaft C is revolved by means of its belt-pulley K the two diametrically-opposite carriers will revolve in opposite directions, thereby rotating, also in alternately opposite directions, the entire train of intermediate intermeshing carrier-wheels.

Each carrier E is preferably cast in one piece with its appropriate cogged driver G, and consists of a block cross-shaped in cross-section having a central bore, through which shaft F is inserted, a collar L being fastened upon the projecting upper end of the shaft, so as to bear lightly against the upper end of the block and prevent motion of the carrier in the direction of the length of the shaft. This collar may be adjusted, as occasion requires, to take up wear, and after proper adjustment may be fastened or locked by means of the binding-screw M. Each of the four arms forming the cross is notched longitudinally to form a semicircular recess N, adapted to form a seat for the spool-holder O. The latter consists of a cylindrical stem having a flanged and screw-threaded top or head P, which is countersunk or recessed for the attachment of the spool or bobbin, and being also provided about midway of its length with a circular disk Q, the under side of which is cut away to form an annular recess R for a purpose hereinafter set forth. The annular edge or flange formed on the under side of disk Q by this recess is beveled on the outside to facilitate the operation of the device, in the manner which will be hereinafter set forth.

Besides the longitudinal notch or recess N each of the four arms of the block is cut away transversely to form a recess S for the spring-latch T. This latch or switching device is of the shape and construction illustrated in the detail views, Figs. 6 and 6ª, by reference to which it will be seen that it consists of a sickle-shaped plate having a thin beveled point *a* of gradually-increasing thickness toward the rearwardly-extending hook *b*. The body of this hook is cut away back of its forward edge, so as to form a raised rim or flange *c*, (illustrated more clearly in the small detail view, Fig. 6ª,) the forward edge of which is also beveled. In other words, the front side of the latch has a beveled edge *a c* of gradually-increasing thickness from the point to the end of the hook *b*, with its point turned slightly in an upward direction. Fastened to and projecting laterally at approximately right angles from this plate is a cylindrical stem *d*, which forms the hinge or pivot on which the device turns. This stem is inserted through a horizontal bore or bearing in its appropriate arm back of the recess S, within which the latch T is placed, Fig. 4, and is held in place by a small headed screw *e*, on removing which the latch may readily be withdrawn. There are of course four of these latches T for each carrier—viz., one for each arm and each hinged within its appropriate recess S. This recess has a sub-recess U in its upper side, formed by cutting out the roof of the recess S, so as to form a semicircular chamber adapted to receive and fit upon one-half part of the spool-holder disk Q, in like manner as the intersecting notch or recess N will receive and fit one-half of the cylindrical stem O. When the spool-holder is inserted into these recesses N U, it will be supported on its under side by the latch T, the hooked part *b c* of which projects up into the annular disk-recess R. To maintain the latch in this normal position, it has a yielding support on its under side, consisting of a headed pin V, which works in a small bore in the body of the carrier and is encircled by a small helical spring W, operating to force the pin in an upward direction against the under side of the pivoted latch, and thus support the free end of the latter, and at the same time form a yielding support for the disk Q of the spool-holder, which, as we have seen, bears against the spring-latch with its under side. It will further be seen that when the free end of the latch is depressed, so as to disengage the hook *b c* from the annular recess R in the spool-holder, the latter can be easily withdrawn from its appropriate seat in the carrier.

When it is desired to replace the spool-holder in its seat, this may be done by simply pushing it into its seat (formed by the recesses N and U) sidewise, the beveled rim of the disk Q permitting the latch-hook to slip under the same and into the recess R without any necessity of first depressing the free end of the latch.

Having in the foregoing described the construction of the carriers, spool-holders, and latches or switches (forming part of the carriers) used for shifting or switching the spool-holders from one carrier to another, I shall now proceed to describe the mechanical operation of the device, as follows: On reference to Fig. 4 it will be seen that the pointed and sharpened free ends of the latches T project beyond the arms of their appropriate carriers, and as adjacent carriers revolve in op-

posite directions it follows that the latches of one carrier will cross those of the adjacent carrier every time a pair of arms of adjacent carriers are aligned with each other, as shown on the drawings. Owing to the shape and upward inclination of the projecting ends of the latches the loaded latch will always pass under the empty one, for the reason that the hook *b* of the empty latch not being in engagement with the disk Q of the spool-holder the said empty latch will be pressed by the spring into a higher position than that occupied by the loaded latch, and consequently the two latches will so engage as to send the spool-holder from the loaded latch into its seat in the opposite carrier. The instant the respective latches have crossed and passed each other and are mutually released they will, actuated by the spring-pins or yielding bearings V, resume their normal positions, in which the hook *b c* will interlock with the flanged disk on the spool-carrier, the hook slipping easily over the beveled edge of the flange. In this manner the whole series of spool-holders are shifted or switched from the arms of one carrier to those of another as they progress in their sinuous course through the race-course, there being, practically, no "course" or "track," however, which is one of the great advantages of my machine, as I avoid the friction, wear, and tear which would result from pushing or pulling the spools through a grooved track. In the absence of such a grooved or slotted track I am enabled to run my machine at a very high rate of speed with a minimum of power, as there is little or no friction when the spool-holders are switched from one carrier to another and no friction whatever, so far as the spool-holders are concerned, while these are held in the carriers on their travel from one carrier to another. As before stated, this construction of the carriers and latches also permits of the instant withdrawal and replacement sidewise of the spool-holders and spools.

Owing to the inclination of the carriers toward the center of the imaginary track in which the spools travel, the latter will never materially change their distance from the point above this center, at which the strands or threads from the spools are interwoven to form the braid. By reference to Fig. 1 it will be seen that all the threads converge toward this point, forming radii in a circle or segment represented by the flaring bearing D. The braid, as it is plaited, is wound between rollers X and Y, located at this point and bearing against each other with a certain amount of spring-pressure to avoid slack. In other words, these rollers may be said to form a tension device in respect of the spools collectively or considered as a unit; but no tension device of any kind is required in my machine to regulate the tension of individual spools or individual threads.

In order to feed the braid as it is being plaited through the rollers X Y, these are revolved toward each other by mechanism which will be readily understood by reference to Fig. 1, and which does not, therefore, require further explanation; but as the detailed construction and arrangement of this part of the machine depends upon the style and character of the braid which is to be plaited I do not limit myself to any particular construction of that part of the apparatus, the essential part of which is a tension device located approximately in the center of an imaginary circle or sphere, of which the threads of strands from the spools form the radii.

It will be obvious that some of the details of the machine, as herein shown and described, may be changed or modified in various ways without changing the construction and operation of the machine as a whole and without departing from the spirit of my invention. Thus, for example, instead of arranging the latches so as to interlock with the spool-holders on the under side they may be reversed so as to interlock with the disk Q on the upper side, said disk in that case of course having the annular recess R on its upper instead of under side.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a braiding-machine, the combination, with a carrier provided with a recess, of a spool-holder or spool having a disk adapted to be seated in the recess in the carrier, and a locking device adapted to engage with a recess in the disk, substantially as described.

2. In a braiding-machine, the combination, with a spool or spool-holder, a carrier provided with a recess, and a disk on the spool-holder intermediate of its ends adapted to be seated in the recess in the carrier, said disk being provided with a recess, of the hinged latch having a rearwardly-extending hook, a headed pin located in a recess in the carrier and bearing against the under side of said hook, and a coiled spring encircling said pin, substantially as described.

3. In a braiding-machine, the combination, with a carrier having a recess, and a spool or spool-holder having a disk provided with a recess and adapted to be seated in the recess in the carrier, of the latch T, having a stem *d* pivoted in the carrier, a beveled edge *a c*, and a rearwardly-extending hook *b*, the headed pin located in a recess in the carrier and bearing against the under side of said hook *b*, and the coiled spring encircling said pin, substantially as described.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

JOSEPH THOMAS.

Witnesses:
FREDK. BALZ,
WILLIAM V. A. POE.