

N. LOMBARD.
BRAIDING MACHINE.

No. 458,471.

Patented Aug. 25, 1891.

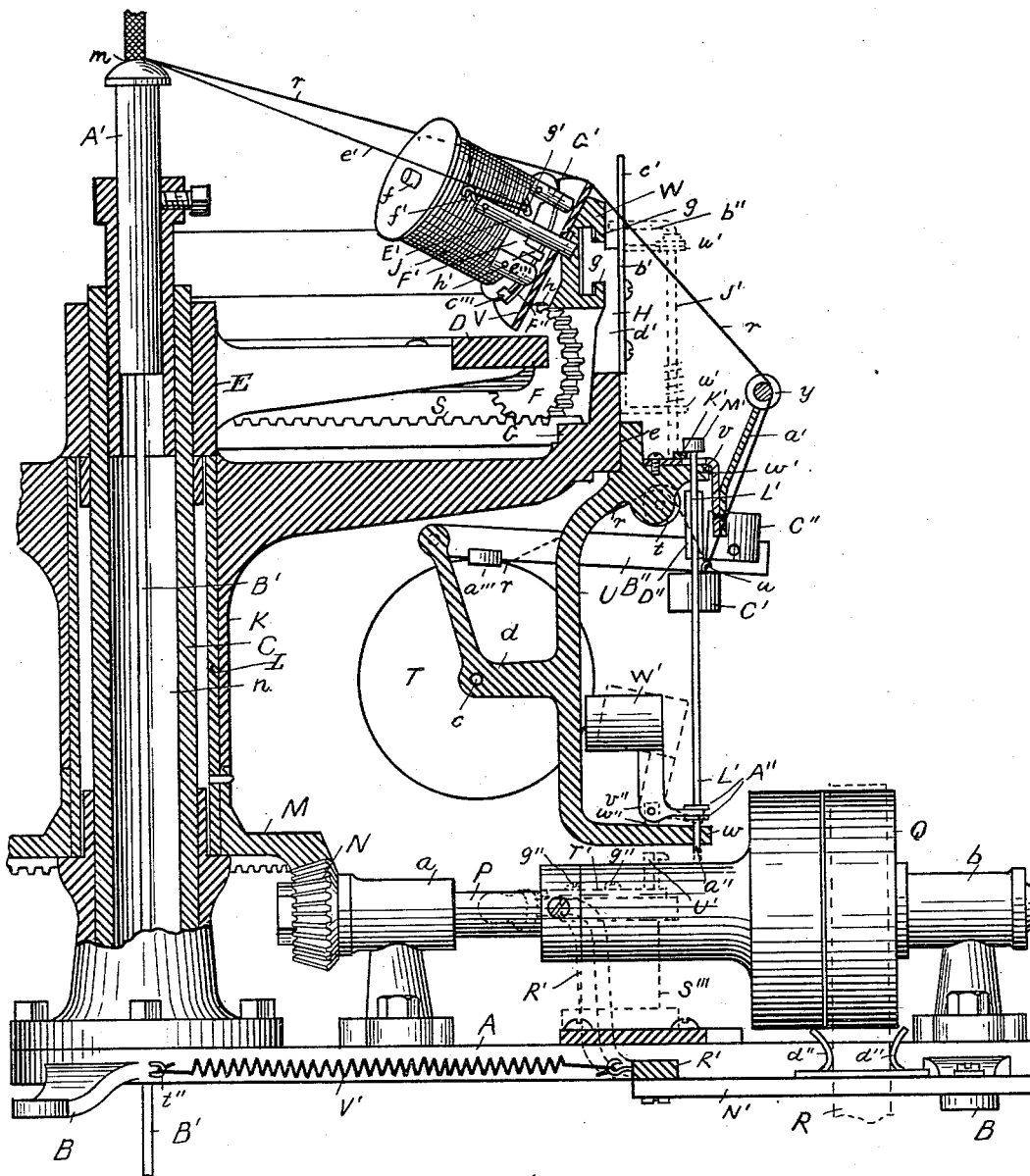


Fig. 1.

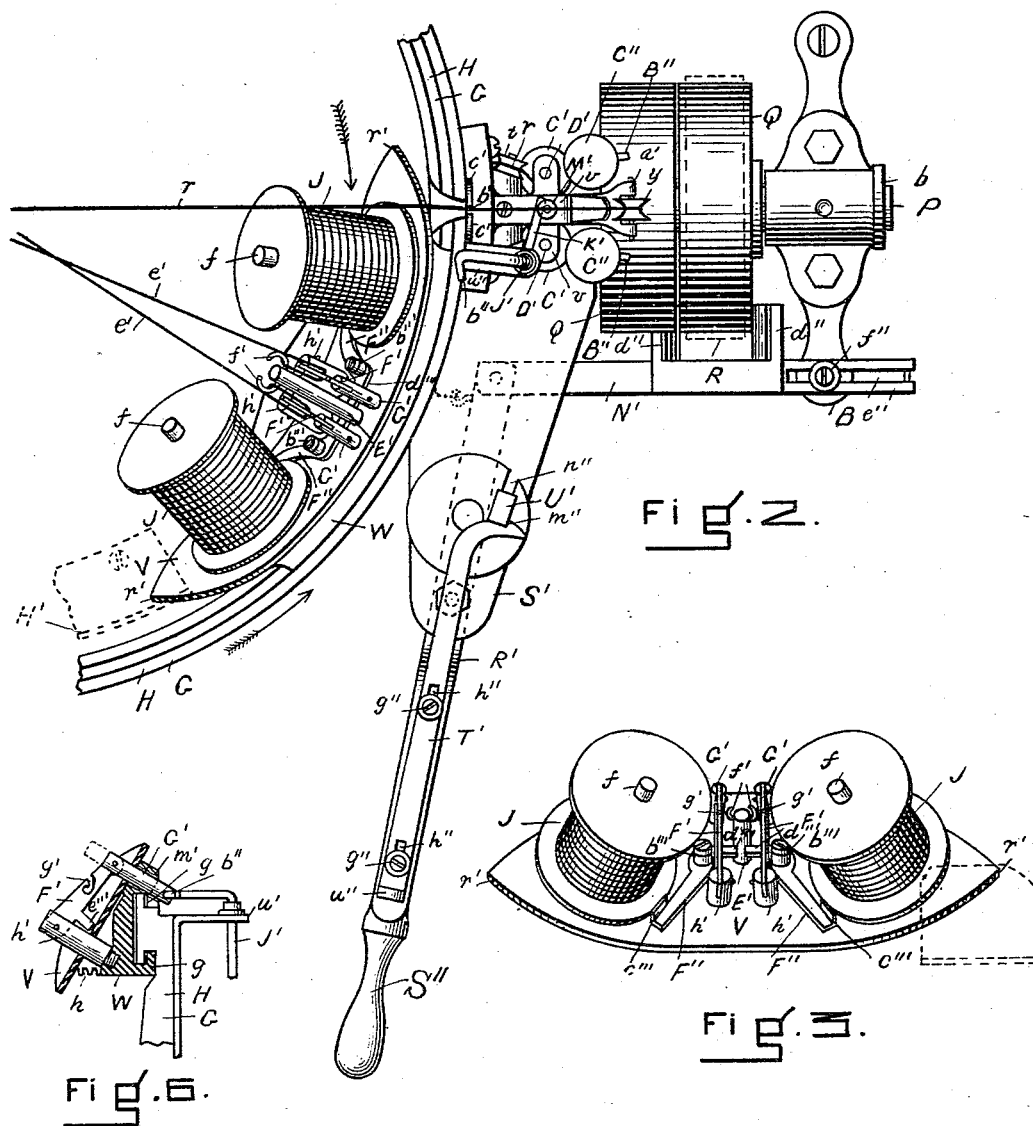
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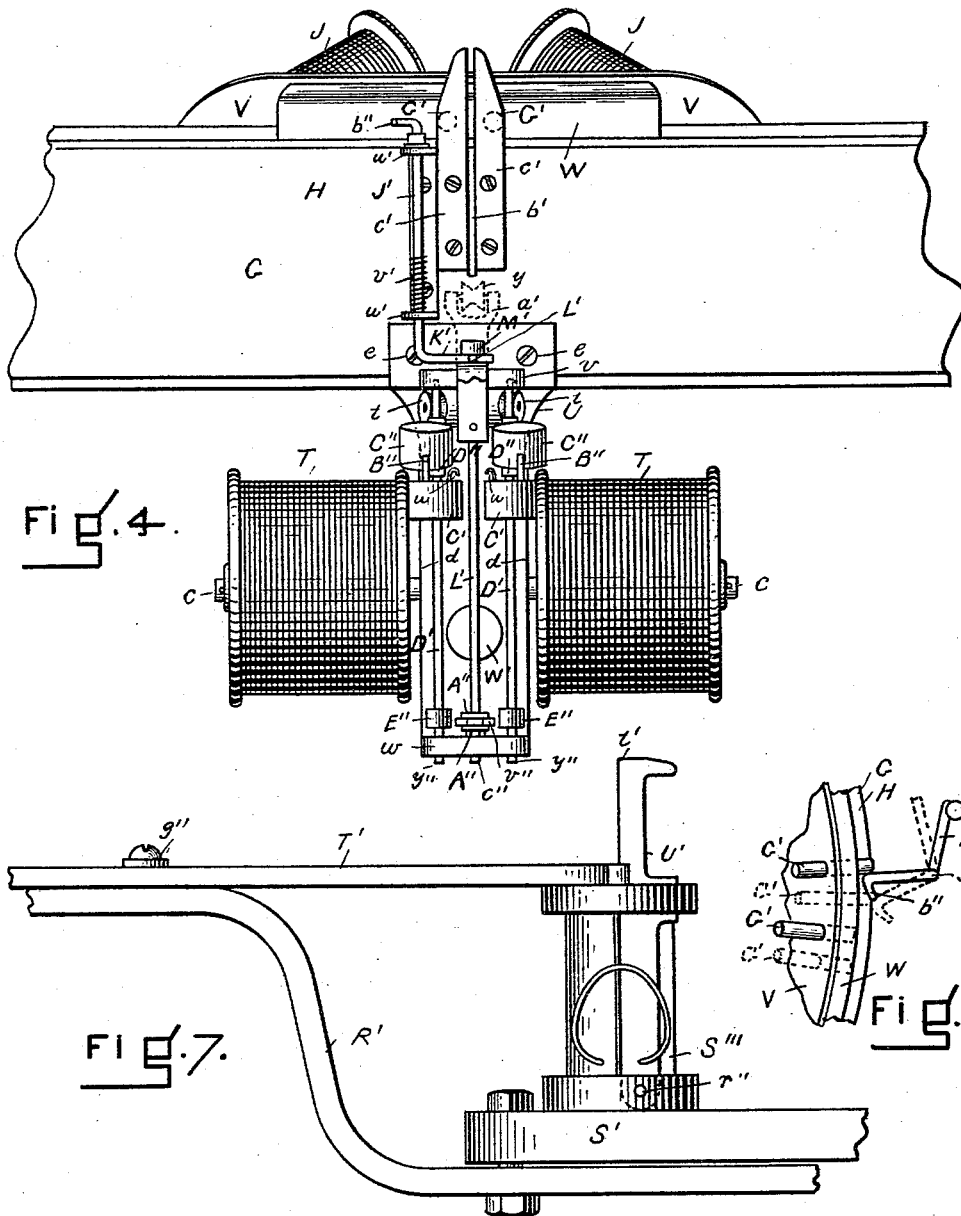
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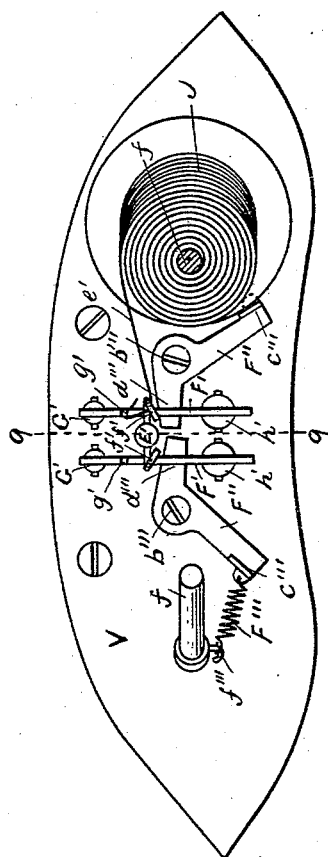


FIG. 1.

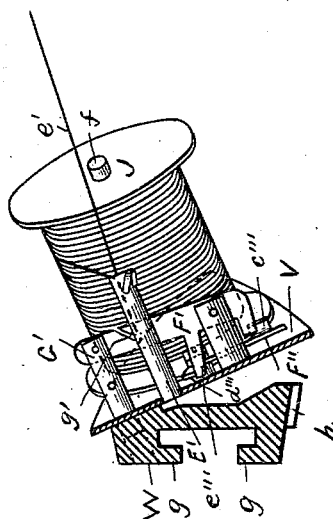


FIG. 2.

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UNITED STATES PATENT OFFICE.

NATHANIEL LOMBARD, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THOMAS A. JOHNSTON AND HENRY A. CLARK, OF SAME PLACE.

BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 458,471, dated August 25, 1891.

Application filed March 6, 1891. Serial No. 384,062. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL LOMBARD, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Braiding-Machines, of which the following is a full, clear, and exact description.

This invention relates to improvements in a braiding-machine for which I have made application for Letters Patent of the United States, Serial No. 356,265, filed June 21, 1890; and the invention consists of the combination, with the carrier-plate for the bobbin, of a switch-plate attached to the carrier-plate and having an edge for guiding the thread past the length of the carrier and bobbin, by which the threads from the lower set of bobbins are passed alternately over and under the bobbins in the upper set, and having supports attached thereto for two or more bobbins.

The invention also consists of means for automatically stopping the machine in case a thread from any of the bobbins breaks, so that the machine will immediately cease operation, all substantially as hereinafter fully described.

The braiding-machine described and shown in the application referred to is of the class of braiding-machines which have two sets of bobbins arranged to move horizontally in circular lines above a common center, one set of bobbins moving in opposite direction to the other set of bobbins. The invention described in said application consists, substantially, of a ring fixed upon a suitable support, upon which is radially mounted a series of gears equidistantly spaced, and another ring concentric with the fixed ring arranged to rotate upon a suitable support and upon which latter ring is an endless circular rack or gear. The rotary ring also has a vertical ring or raceway for one set of bobbins, the other set of bobbins being placed in proper positions beneath and secured to and carried by the rotary ring. Each bobbin is attached to a curved plate toothed on its under edge and of a length to span from center to center of the radial gears, with which it meshes at certain times, and when in connection with a single gear it permits the passage of a bobbin-

thread at stated intervals of time beneath it and its shuttle. The endless gear, by suitable connection with proper mechanism, is made to rotate in one direction, carrying with it the bobbins supported thereon, which compels the other bobbins, through their gear-plates engaging with the radially-mounted gears, to travel in the opposite direction, and as they all so travel the threads therefrom lead to the center of the machine and are there braided together to either form a braid in itself or be braided round and about a central core or wire which passes up through the hollow standard and which is fed from the machine in the usual or in any suitable manner. To secure this braiding of the threads the threads from the lower bobbins are passed over and under the upper bobbins and their threads alternately and successively by means of switch-plates, each secured to a bobbin-carrier plate, each of which is of such a length and width in relation to the distance the bobbins are apart and is so located on its carrier-plate that in running the machine in the movements of the bobbins the threads of the lower bobbins are carried over the upper bobbin and its thread and then under the next bobbin and its thread, and so on alternately over and under the upper bobbins and their threads.

In the machine described in the application referred to there is only one bobbin to a switch-plate and carrier, whereas in the present application there are two bobbins to each switch-plate and carrier—an important advantage, as the machine can be considerably reduced in diameter with the same number of bobbins, making it more compact, which is especially desirable when a large number of bobbins are to be used in both sets, the present machine having eight bobbins in the upper and eight bobbins in the lower set.

In the drawings accompanying this specification are illustrated portions of the braiding-machine described and shown in said application, sufficient, it is deemed, for a full understanding thereof, and in connection therewith the parts pertaining to the present invention.

Figure 1 is a vertical central section of the

machine from the center to one side on a vertical line between the two bobbins on the revolving ring. Fig. 2 is a detail plan view showing two of the upper bobbins and its switch-plate, with other parts in plan view. Fig. 3 is a detail perspective view of a switch-plate with its two bobbins. Fig. 4 is a detail front view showing a portion of the ring and two of the lower bobbins and their support and other parts. Figs. 5 and 6 are respectively a detail plan and a cross-sectional view, to be hereinafter referred to. Fig. 7 is a detail elevation showing the means of locking the belt-shipper lever. Fig. 8 is a view in elevation of a switch-plate with one bobbin in cross-section, the other bobbin being removed. Fig. 9 is a cross-section on line 9 9, Fig. 8.

In the drawings, A is a base or bed plate having feet B.

C is a tubular post or standard secured to the base and having secured to it the ring D by its hub E, having a series of gears F, radially mounted thereon at regular intervals. Concentrically with and below this ring D is another ring G, having a vertical circular rim H, the top edge of which serves as a raceway for the bobbins J in the upper set, and by its hub K it is rigidly fixed to a sleeve L, which sleeve is adapted to revolve about the standard, motion being communicated to it and the ring G by a horizontal miter gear-wheel M, fixed to the sleeve and engaging with a vertical miter gear-wheel N on the end of a horizontal shaft P, adapted to turn in bearings *a b* on the bed-plate A, and having a driving-pulley Q, operated by a belt R, connected to any suitable driving-power. The ring G has an endless rack or gear S on its upper edge, with which the radial gears F engage, and on which ring is supported the bobbins T of the lower set, two of which bobbins are shown in side elevation in Fig. 4, each of which is supported and arranged to turn freely on a separate horizontal rod or spindle *c* of an arm *d* of a downwardly-projecting bracket U, secured to the ring G at *e*. The bobbins in each set are arranged in pairs, and each pair is similar to every other pair in its set, and the mechanism in connection therewith for operating each is alike in all respects. Each bobbin J of each pair is supported and arranged to freely turn on a separate rod or spindle *f* of a switch-plate V, secured to a carrier-plate W, which rods extend radially toward the central vertical line of the machine. The carrier-plate W consists of a bent casting rectangular in side elevation of the same curvature as the rim or circular raceway H upon which it travels, and it has top and bottom lateral lips *g*, which grasp the raceway, as shown in cross-section in Fig. 1, and its under edge is toothed, as at *h* in said figure, to engage with the radial gears F, the carrier-plate being of a length to extend from center to center of any two adjacent

gears, there being two radial gears to each carrier-plate. The motion of the bobbin-carrier is continuous; but while it is being carried solely by one of these gears an interval or opening between it and the next gear occurs, during which a lower bobbin-thread is enabled to pass down by the bobbins and carrier-plate, which moves across and over it. The switch-plate is secured to the inner side of the bobbin-carrier plate by screws or otherwise, which from its width as the threads from a pair of bobbins in the lower set pass over it and under it causes such threads to be carried clear of its bobbins above and the carrier-plate teeth below. The switch-plate is longitudinally of the same curvature as the carrier-plate and rim or circular raceway and laterally is bent so as to be at all points substantially the same distance radially from the upper end of a tube A', fitting in the upper end of the tubular standard C, to which all the threads from the bobbins lead, which is the point where they are all braided together, in the present instance around and about a wire or cord B', which passes up through the central vertical passage *n* of the standard C, being fed by any suitable feeding mechanism, as usual in braiding-machines, but not shown in the drawings. A thread *r* from each bobbin of a pair of lower bobbins passes up and over a grooved roll *t*, pivoted to the bracket, thence down through an eye *u* in a weight C', arranged to freely move up and down on a vertical rod D', arranged to slide up and down in the arms *v w* of the bracket U, and then both pass together practically as one over a grooved roll *y* on the outer end of a spring-arm *a'*, secured to the bracket U, thence through a vertical guide-slot *b'* between two uprights *c'*, secured to the outside of the ring G, over the machine to the upper end of the central tube A'. The rim also has a vertical slot *d'* back of and coincident with said guide-slot *b'*. A thread *e'* from each bobbin J of a switch-plate passes through an eye *f'* on a post E' of the switch-plate, thence into an open slot *g'* in a separate lever F', pivoted at one end to a lug *h'* of the switch-plate, and having pivoted to its other end a round pin G', which passes freely through a socket *m'* in the switch-plate and carrier-plate, its outer end, when the machine is in operation, not projecting beyond the outer surface or side of the carrier-plate. From this lever F' the thread passes to the upper end of the tube A'. The normal height of the threads from each pair of lower bobbins as they travel as one through the guide-slot *b'* is in a plane slightly below the plane of the longitudinal axes of the switch-plates, so that the end *r'* of each switch-plate will pass above the threads, the threads passing along the under edge of the switch-plate and being depressed and held below the plane of the teeth of the bobbin-carrier plate so that all parts of the bobbin and its support are

free to pass over such threads. To have these threads pass over a pair of bobbins the threads in this continued movement strike switch-arms H', fixed to the ring D at regular intervals, which raise them sufficiently for them to be in a plane above the longitudinal axis or point *r'* of the moving switch-plate, which then raises the threads as they pass over it high enough for the bobbins and all their parts to pass freely under the threads, so that in the operation of the machine the threads from each pair of lower bobbins pass alternately below and above the upper pairs of bobbins as they travel along in opposite directions. A little at the left of the guide-slot *b'* is a vertical rod J', disposed in sockets in two projecting arms *u'* of the rim G, and in which sockets it can freely turn, having an angular horizontal arm K' at its lower end resting on the upper side of the bracket-arm *v* and having a spiral spring *v'* attached to it to hold the rod-arm K' against a vertical rod L', arranged to slide up and down within certain limits in sockets *w'* in the arms *v*, the said rod L' having a collar or head M' on its upper end, so that with the arm K' bearing against the rod L', as shown in Figs. 1, 2, and 4, the rod, by its head M', will be above and rest upon the arm K', holding the rod up so that its lower end *a''* will be above a certain horizontal plane, for a purpose to be hereinafter described. The upper end of the rod J' is bent in a horizontal line toward and over ring G and has an angular end *b''*, which when its arm K' rests against the rod L', as shown in said figures, projects over the upper side or edge of the rim G, but a little outside of the line of travel of the outer side of the carrier-plate, as shown in Figs. 1, 5, and 6, so that the carrier-plate will not strike it, the bent end *b''* of this rod being in the same horizontal plane as the pins G' of the bobbin-carrier plates.

N' is a shipper-bar having arms *d''*, which embrace the belt R, by which, with proper movements, the belt is shipped onto the driving-pulley or loose pulley Q', as usual. This shipper-bar moves longitudinally back and forth in front of the pulleys and is guided and partially held to its work by a longitudinally-slotted extension *e''*, engaging with a screw-pin *f''*, secured to a foot B. The other end of the shipper-bar is pivoted to a lever R', pivoted on the underside of an arm S' of the bed-plate and having a handle S'' for operation of the same. On the upper side of the shipper-lever is a bar T', extending along the length of the same and secured thereto by screws *g''*, passing through elongated slots *h''* in the bar T' and screwing into the lever, which allows longitudinal movement thereon, its inner end being curved and provided with a notch *m''*, arranged, when the lever is moved to operate the shipper, to move the belt upon the driving-pulley to engage with a vertical spring-arm U', pivoted at *r''* to a post S''

and guided by a slot *n''*, by which the lever is locked in such position to prevent accidental unshipping of the belt, as shown in Figs. 2 and 7. A spiral spring V' is attached to one end of the shipper-bar by one end, its other end being connected to the bed at *t''*, the tension of which acts to move the shipper to the left and move the belt with it from the driving-pulley onto the loose pulley if the spring-arm U' is disengaged from the operating-lever to let it be free to move. The bar T' on the shipper-lever has an upward projection *u''* on its end near the handle, by which it can be moved by hand for its engagement with the spring-arm U' when moving the shipper-lever by hand to start the machine.

In running the machine the tension on a thread of each upper bobbin as it is being braided pulls upon the lever F', attached to the switch-plate, strongly enough to hold the pin G' back, so that its outer end will not project beyond the outer side of the carrier-plate; but the instant such thread breaks, its tension on the lever being then off, the centrifugal force exerted by the travel of the carrier-plate in a circular line then acts to throw the pin G' outward, so that it will project beyond the periphery or outer side of the bobbin-carrier plate, and as in the travel of the ring and the carrier-plate in opposite directions the pin comes to the upper arm of the swiveling rod J' it strikes against its end *b''*, swings it so as to move its lower arm K' against its spring out from under the head M' of the vertical rod L', leaving the rod free to drop for its lower end *c''* to be below the horizontal plane of the upper end *t'* of the spring-arm U', which locks the shipper-lever R', so that as the rod L' approaches the arm U' its lower end will strike the upper end *t'* of the arm U' and move it away from its engagement with the shipper-lever, leaving it and the shipper free to be moved by the spring V', which moves the belt from the driving-pulley to the loose pulley, stopping the machine, so that the thread can be attended to by the operator, when the machine can be started into operation as before.

To insure the rod L' dropping after the arm K' has been moved away from it, a weight W', having a downwardly-projecting arm *v''* pivoted by such arm to lugs or ears *w''* of the bracket-arm *w*, has an extension of its arm disposed between two collars A'' of the rod L', the weight extending backward, as shown in Fig. 1, and resting in its normal position against the bracket U, so that its gravity will by its collar connection hold the rod up for the spring-arm K' to pass under the rod-head M', and which weight, when the machine is running, the instant the arm K' is moved out from under the rod-head by the pin striking its operating-arm *b''* will be thrown or swung outward by the centrifugal force, carrying down the rod L' by its engagement therewith

into position to strike and move the arm to unlock the shipper-lever, as described, and the instant the machine stops the gravity of the weight will swing it back into its normal position, raising the rod sufficiently for the arm K' of the rod J' to pass by its spring under the head of the rod L' to hold and keep it up in its normal position for its lower end to be above or out of the way of the shipper-lever-locking arm in the running of the machine.

On a rear arm of the bracket U is pivoted a horizontal lever B'', having an enlarged piece on its under side, which is adapted to rest upon the edge of a head a''' of the bobbin, the outer end of the lever having a weight C'' secured to it, by which friction is created on the bobbin to prevent too free unwinding of the thread of the bobbin. This lever extends outward and is disposed over a weight C' of one of the rods D', so that as the thread r of its bobbin pulls too hard it will raise the weight C' up against the under side of the lever, raising it more or less, reducing its friction on the bobbin, and thus allowing the thread to unwind freer, as desired.

On each rod D' is secured a collar D'' in such location above the weight C' that when the machine is running the tension of the thread r will keep the weight up sufficiently for it to abut against the collar and raise the rod up to such a height that its lower end will be above the horizontal plane of the spring-shipper-lever catch. A collar E'' on the lower end of the rod prevents by its resting on the bracket-arm w the rod falling below a certain point. If a thread from a lower bobbin breaks, the weight C', which it supports, drops down upon the collar E'' and forces its respective rod D' down to its lowermost position, which is such that as it is carried round with the ring it will, by its lower end y'', approach and strike the shipper-lever catch-arm and move it from its engagement therewith, stopping the machine, as before described, for the rod L' for the upper bobbin-threads. Thus whether a thread from an upper bobbin or from a lower bobbin breaks, their respective rods will drop and stop the machine, as described.

It is preferable to have the rods L' and D' arranged for operation, as described, on each bracket supporting a pair of lower bobbins, so that as soon as any thread breaks the machine will be stopped quickly, although, as is obvious, a less number could be arranged, as desired; but the operation of each set would be the same, each one being a duplicate of the others.

Each upper bobbin has a lever F'' pivoted at b''' to its switch-plate and arranged to bear by its end c''' on the bobbin-head, as shown in Figs. 1, 3, and 8, to create friction thereon from the tension of a spiral spring F''', secured by one end to the lever end c'''

and by its other end to the plate at f'''. Each lever also has an arm d''', which is in position for an arm e''' of the thread-lever F' to bear against it, so that if the thread is pulling strongly it will raise the lever F', which by its arm e''' will press against the arm d''' of the friction-lever and raise or move it from the bobbin-head, leaving the bobbin freer movement for the easy delivery of the thread therefrom, and as the thread pulls with less force the lever F' falls and allows the friction-lever to press the more firmly on the bobbin-head to prevent undue unwinding of the thread.

Obviously more than two bobbins can be attached to one switch-plate and carrier, as desired, the other parts necessary for the stopping of the machine in connection therewith being increased correspondingly or not, as desired.

Having thus described my invention, what I claim is—

1. In a braiding-machine, in combination, a bobbin-carrier, a support thereon for carrying a bobbin, and a switch-plate connected thereto having an edge for guiding the thread past the length of the carrier and bobbin.

2. In a braiding-machine, in combination, a bobbin-carrier, supports for carrying two or more bobbins, and a switch-plate connected thereto having an edge for guiding the thread past the length of the carrier and bobbins.

3. In a braiding-machine, in combination, a bobbin-carrier, supports for carrying two or more bobbins, and a switch-plate connected thereto having a pointed end and an upper and lower edge for guiding the thread over and under the carrier and bobbins.

4. In a braiding-machine, in combination, a bobbin-carrier, supports thereon for carrying two or more bobbins, and a switch-plate connected thereto having oppositely-pointed ends and an upper and lower edge for guiding the thread over and under the carrier and bobbins.

5. In a braiding-machine, in combination, a bobbin-carrier provided with a socket and having a pin arranged to slide back and forth in said socket, a pivoted lever adapted to engage the thread from the bobbin and to which said pin is attached, a bar or rod L', arranged to slide up and down on a support and to move into position to unlock the driving mechanism of the machine, and a rod J', engaging with said rod L' to hold it in position and provided with an arm projecting into position to be acted upon by said pin, provided the thread from the bobbin breaks.

6. In a braiding-machine, in combination, a bobbin-carrier provided with a socket and having a pin arranged to slide back and forth in said socket, a pivoted lever adapted to engage the thread from the bobbin and to which said pin is attached, a bar or rod L', arranged to slide up and down on a support and to move into position to unlock the driving

mechanism of the machine, a weighted arm
pivoted to a support and adapted to engage
with said rod, and a rod J', engaging with
said rod L' to hold it in position and pro-
5 vided with an arm projecting into position to
be acted upon by said pin, provided the
thread from the bobbin breaks.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing
witnesses.

NATHANIEL LOMBARD.

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