

J. KAPPELER.
BRAIDING MACHINE.
APPLICATION FILED MAY 14, 1904.

2 SHEETS—SHEET 1.

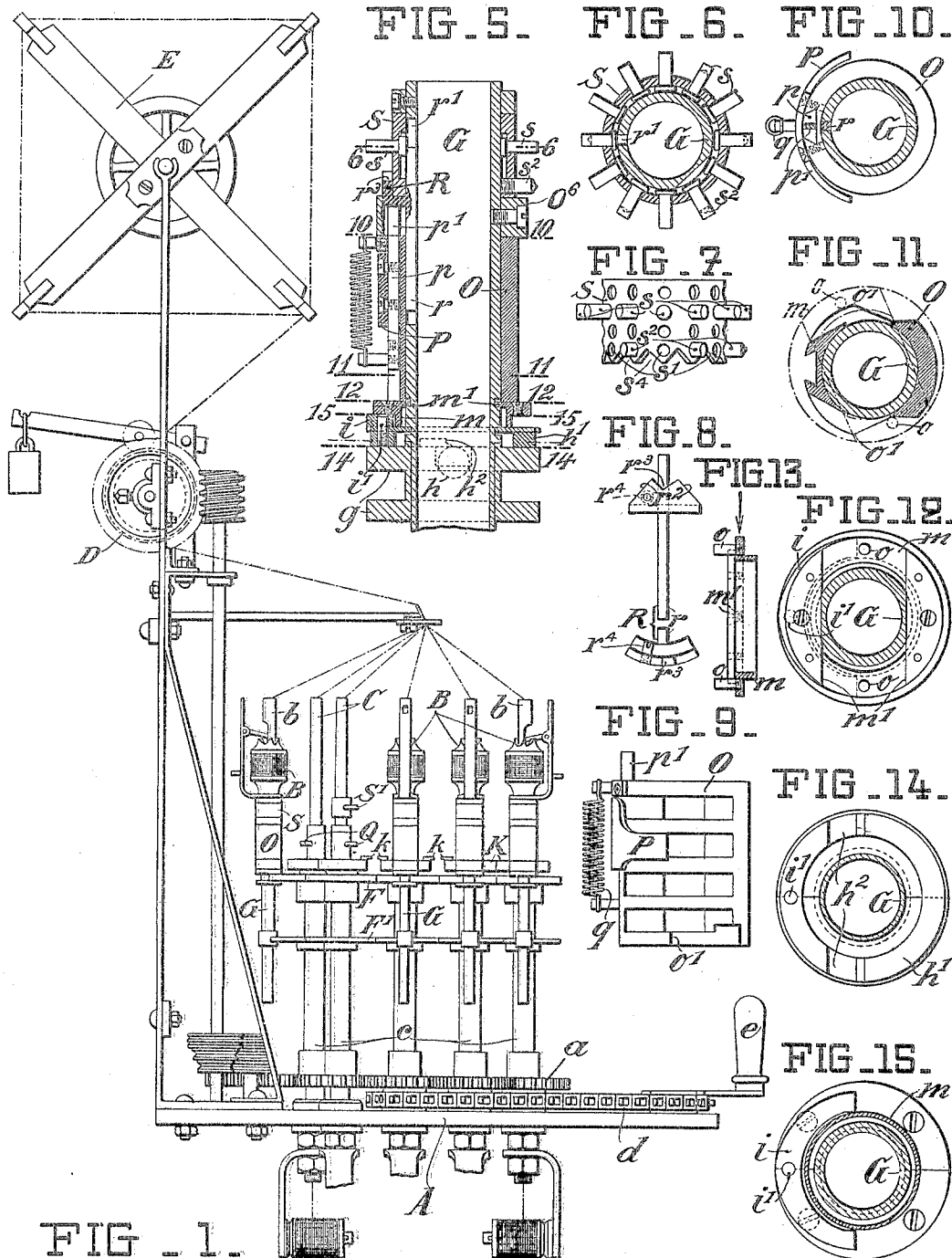


FIG. 1.

WITNESSES:

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Rene' McNamee

INVENTOR:

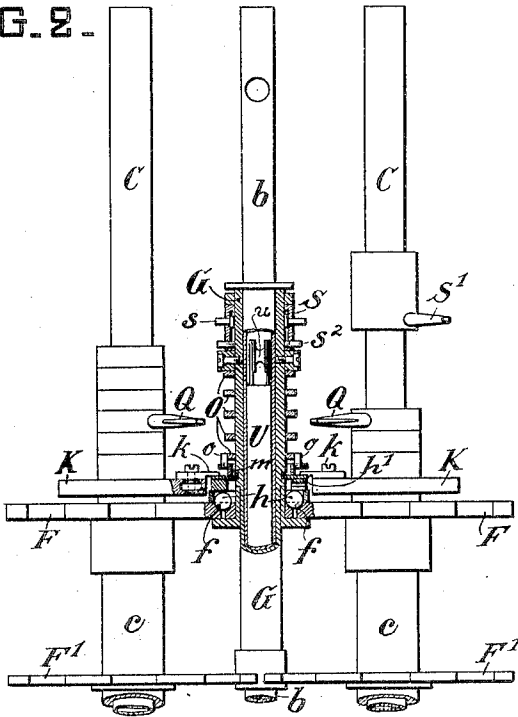
Jean Kappeler,

By his Attorneys:

Arthur C. Oranger & Co

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FIG. 2.



2 SHEETS—SHEET 2.

FIG. 4.

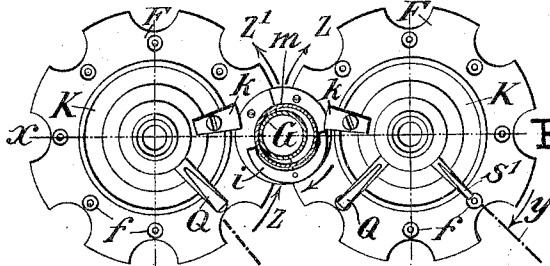
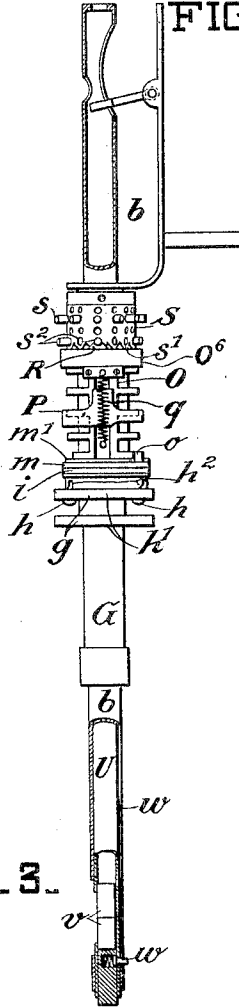
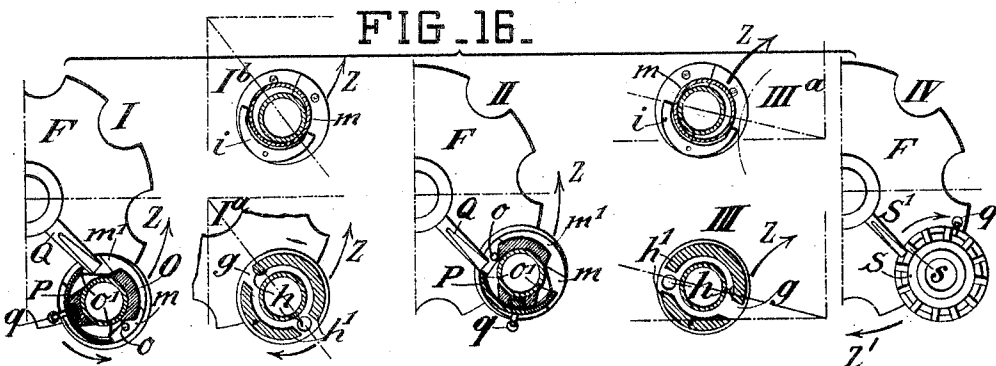


FIG. 3.

FIG. 16.



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UNITED STATES PATENT OFFICE.

JEAN KAPPELER, OF MELLINGEN, SWITZERLAND.

BRAIDING-MACHINE.

No. 802,645.

Specification of Letters Patent.

Patented Oct. 24, 1905.

Application filed May 14, 1904. Serial No. 208,049.

To all whom it may concern:

Be it known that I, JEAN KAPPELER, mechanician, a citizen of the Swiss Republic, residing at Mellingen, Canton Aargau, Switzerland, have invented new and useful Improvements in Braiding-Machines, of which the following is a complete, clear, and exact specification.

The present invention refers to braiding-machines in which the bobbins are carried by means of rotating plates included in the heads of the machine.

One improvement relates to the bobbin-guiding arrangement; and it consists in the use for the conducting of the bobbin of an automatic coupling by means of which the same can alternately be connected to one or other of the rotating plates, whereby the conditions for working the machine are much more favorable and sure. A reciprocal reversing of the bobbin-coupling in the manner necessary for the guiding of the bobbin according to the pattern required is brought about in the course of the movement of the bobbin by a pattern mechanism, (preferably including one or more changing-pins, which are arranged in the heads of the machine,) such mechanism allowing of changing the course of the bobbins *ad libitum*.

A further improvement consists in the use of a mechanical contrivance by which the tension of the bobbin-threads may be easily and quickly regulated.

The annexed drawings illustrate a mode of carrying out the invention.

Figure 1 represents an elevation of a braiding-machine with my improvements applied thereto. Fig. 2 is an elevation, partly in section, and Fig. 3 a plan view, of two machine-heads in combination with a single bobbin-carrier without spool. Fig. 4 shows the bobbin-carrier by itself with hollow spindle without spool, whereby the spindle is partially given in section. Figs. 5 to 15 refer to details hereinafter mentioned and are shown on a larger scale than the preceding figures. Among these Figs. 6, 10, 11, 12, 14, and 15 are horizontal sections taken, respectively, through the correspondingly-numbered dotted lines shown on Fig. 5, that shown in Fig. 14 being viewed from below. Fig. 16 serves for explaining the *modus operandi* of the bobbin arrangement.

A, Fig. 1, is the table or top plate of the machine above which the bobbins B, supported on hollow spindles b, move in a ser-

pentine manner through the machine-heads, in whose centers there are fixed vertical rods C in order to produce a braid which is drawn off by the take-up roller D and wound onto the reel E. The bobbins are carried round by means of rotating plates F, arranged in the machine-heads, which receive the bobbin-carriers in notches provided at their circumferences, and which, with the supplementary plates F', (insuring the stability of the bobbins,) are fixed on sockets c, turning on rods C, and caused to simultaneously revolve by means of toothed wheels a and the chain-gear d by means of a hand-crank e.

The general action of this braiding-machine is sufficiently well known, and it is therefore not necessary to enter into further details respecting the same. For the braiding arrangement, properly speaking, which represents the essential part of the invention and conducts the bobbins in their requisite path, reference is made to Figs. 2 to 4 with detail views, with the observation that the description of details following only treats of one bobbin; but it applies equally to all bobbins of the machine.

Spindle b of the bobbin-carrier fits in a case G, on which is arranged a ring or socket member g, provided with two flanges which overlap the edges of one or other of the plates F (both of them at the point of contact) above and below when situated in the notches of the plates. The upper flange of this ring g has two oppositely-lying openings for the passage of two balls h, which have the function of temporarily coupling the rings g of the respective bobbin-carriers alternately with the one or other of the plates F. Every plate F is provided behind each notch with a ball hole or hollow f, while there is mounted above the ring g a rotatable slide h', turning round the case G, which at its lower side is cut out at h², Figs. 5 and 14. These parts (ring g with balls h and rotatable slide h') form, in conjunction with the hollows f of the plates F, an automatic coupling in form of a double-ball fastening between the bobbin-carrier and the plates, inasmuch as normally one of the balls h lies in a hollow f of the one plate F and by means of the rotatable slide h' is prevented from rising, Fig. 5, while the other ball can reënter unhindered the corresponding cutting h² of the slide when the bobbin-carrier in the conducting-plate F comes into the reach of the plate next following and the free ball is made to run on its upper surface.

The rotatable slide h' carries a curved engaging lever i , Figs. 3, 15, and 16, which is pivoted at i' and by means of which the slide h' can be turned from one end position, in which it fastens one ball and releases the other, to the other end position, in which it by an opposite movement fastens the latter and releases the first. In order that these movements shall take place automatically, there are provided in the heads of the machine on plates K adjustable projections k , Figs. 2 and 3, which are at the same height as the curved lever i and which at each movement of the bobbin can produce the change in the one or other sense, according as the curved lever i comes with one or the other end into the sphere of action of one or the other of the projections k , as will be more fully explained hereinafter. In order to bring the curved lever i out of the reach of one of the projections k into that of the other, there is provided a ring m of angular cross-section, Figs. 5 and 13, whose vertical side is engaged by the ends of the lever i , Fig. 15, and which is guided to move in a straight line by means of two guiding-rails m' , engaging two recesses in the case G, Figs. 5 and 12, and the displacement of the ring m into an eccentric position in the one or other direction results in the lever i being turned on its pivot, and one of its ends is brought nearer to the central axis of the case G and the other is removed from it, so that one end of said lever i , which is represented in Fig. 15 in its center position, is removed so far from such middle axis that (as the bobbin is moved past the proper point) it can engage one or the other projection k , and thus produce the angular displacement of the rotatable slide h' . The displacement of the ring m into eccentric position (which thus operated the coupling mechanism) is produced by means of a turnable controlling-collar O on the case G, (in Figs. 9, 10, and 11 represented separately,) which is provided at its lower end with two flattened portions, Fig. 11, and fits between two pins o of the ring m , Figs. 12 and 13, so that when the collar O is turned one or the other edge o' , Fig. 11, engages the corresponding pin o and pushes the same along, with the ring m , sidewise, whereby the latter is guided in a straight line by means of the rails m' and the lever i is turned, as described. The collar O is held against upward movement by a collar O⁶, Figs. 4 and 5.

Outside of the controlling-collar O there is a stirrup P, which is adjustable on a vertically-movable rail p on the collar O and is adapted to be automatically brought into two different positions of height, the one in the sphere of action of changing-pins Q, which are centrally fixed in the heads of the machine, and the other out of the sphere of action of such pins. A spring q , which is connected at one end to a projection on the rail p and at its

other end to a projection on the collar O, has a tendency to hold the rail p , with the stirrup P, in its highest position, in which the latter, by means of the upper end p' of the rail p , lifts up a so-called "disengager" in form of a saddle-piece R, which is guided in its upward and downward movements by means of rod r , lying in a vertical slot r' , Figs. 5 and 6, in the case G. This saddle-piece R, which is represented with its guiding-rod in Fig. 8 separately, has at its ends two beveled surfaces r^2 and at its top a saddle r^3 . It has for its object to coöperate with a pattern-collar S, separately represented in Figs. 6 and 7. This collar has at its upper part a circular row of pins s , by which means a turning movement step by step can be imparted to the collar, for which purpose (see Figs. 2 and 3) on one side of the right-hand machine-head, at the same elevation as the circular pin-row s , a switch-pin S' is provided, which at each revolution of the bobbin advances the pattern-collar S one pin s in this machine-head. It will be understood that the machine may have any suitable number of such switch-pins, which may be arranged upon several rods C, so as to cause the pattern-collar to be switched at different points on the bobbin course when the bobbin is running through all of the heads of the machine. The arrangement should be such that no one bobbin should interfere with the succeeding or preceding bobbin. On the lower end the pattern-collar S has at its circumference a circular row of openings s' . In some of these openings pins s^2 are inserted, which are within the sphere of action of the saddle-piece R. When the collar S turns, one of the pins s^2 engages one of the beveled surfaces r^2 on the saddle-piece R and pushes the latter down, (against the action of the spring q .) The pin is temporarily held fast in the saddle r^3 and the rail p is depressed, thus placing the stirrup P of the controlling-collar O on a line with the changing-pin Q, so that the latter by engaging the stirrup P can turn the controlling-collar O, and thus by means of the ring m can bring the lever i into a position in which it is adapted (through the help of the projections k) to bring about an angular displacement of the slide h' and through the described operation of the double-ball-coupling device of the bobbin-carrier to effect the passage of the same from one plate to another. This operation repeats itself as often as the saddle-piece R is pushed down by means of a pin s^2 of the pattern-collar. When, however, at the turning of the pattern-collar S no pin s^2 runs onto the saddle-piece, the latter is lifted and the stirrup P is withdrawn from the influence of the changing-pin Q. Therefore, according as the saddle-piece R is pressed down by means of a pin s^2 of the collar S or not, there takes place a transference of the bobbin from one plate to the other, or the

bobbin remains (for one or more revolutions) on the same plate, whereby a change in the pattern of the braided fabric takes place. This is why the collar S is called a "pattern-collared."

The collar S is formed with serrations s^4 on its lower side, which are designed to engage a screw-stud r^4 on the saddle-piece R, whereby to prevent too great a rotative movement of the collar as it is turned by the switch-pins S' in case no pin s^2 is in position to operate the stirrup P.

The working of the above-described arrangement is as follows: For this purpose let it be kept in mind that the bobbin-carrier proceeds successively through any two machine-heads, as shown in Fig. 3, in an approximately 8-like course. To explain this course of the bobbin-carrier more clearly, there are given several positions of its members in Fig. 16. Assume that the bobbin-carrier move from the point x , Fig. 3, of its course and be taken by the left plate F in the direction of the arrow Z. The ball h of the coupling lying next to the axis of this plate lies in the hollow f of the plate locked by the slide h' , while the other ball lies free, Fig. 16, position I^a. After making an angle of about one hundred and twenty degrees the stirrup P, which by means of a pin s^2 of the pattern-collar S, as seen at Fig. 4, is held at the elevation of the changing-pins Q, pushes onto the changing-pin Q belonging to the left head, whereby the controlling-collar O is turned, Fig. 16, position II, and by means of the shifting of the ring m , brought about by the pins o , reverses the position of the lever i out of the eccentric position indicated on Fig. 16, I^b, into that of Fig. 3. In the further course of the bobbin movement the free unlocked ball h runs, so to speak, without friction on the plate F of the right-hand machine-head in Fig. 3 in order ultimately (when the bobbin arrives at the position indicated in Fig. 3) to fall into the hollow f of this plate. In the same moment the reversed lever i pushes against the projection k of that head, Fig. 3, whereby the slide h' is turned, locks the ball, which was until then free, and releases the other, Fig. 16, position III, so that the bobbin is uncoupled from the left plate, but is coupled with the right one and is now carried farther on by the same. The lever i , thereby carried along by the slide h' , remains, as is evident, out of the reach of the projection k , belonging to the left head, while the ring m still retains the previously-assigned eccentric position for the present, Fig. 16, position III^a. As soon, therefore, as the bobbin, now guided by means of the right plate, attains the position y , Fig. 3, a pin s of the pattern-collar S touches the switch-pin S', Fig. 16, position IV, so that the latter in the further progress advances the pattern-collar S and again allows a pin s^2 to engage

the saddle-piece R while lowering the same. (It is assumed that two pins s^2 immediately follow each other on the pattern-collar.) The stirrup P thus remains in the lowest position and at last by engaging the changing-pin Q of the right machine-head an analogous process takes place, only that now the various parts are so operated that a disengagement of the bobbin-carrier from the right plate F and a coupling of the same with the left plate F takes place, and the bobbin, following the direction of the arrow Z', can again attain the point of departure. Starting from this point, the bobbin always takes the same course until a change in the switching takes place in the position y of the pattern-collar S. If this presents no pin s^2 to the saddle-piece R, the saddle-piece R, along with the stirrup P, under tension of the spring g can ascend, which allows the stirrup P to pass above the changing-pin Q of the right machine-head. A reversal of the controlling-collar O and of the ring m , influencing the curved lever i , does not take place, so that the latter maintains the position III^a. (Indicated in Fig. 16.) The coupling of the bobbin-carrier with the right plate F is maintained, Fig. 16, position III, and the bobbin turns in a circle in the right machine-head, which continues until in the sequence of the switching of the pattern-collar S a pin s^2 of the same again pushes down the saddle-piece R, and thereby again brings the stirrup P into the reach of the changing-pin Q of the right machine-head. According to the number of the pins s^2 on the pattern-collar S and their respective arrangement the bobbin can be caused to move in periodically-returning sequences. For example, a course through both heads may be given to it, then a course through one head, and again a course through both heads, and afterward two courses through one head or one run through both heads, three runs through one head, and again a run through both heads, &c. These alterations are manifold and each of the same corresponds, as is evident, to a different braided pattern.

What has here been said of two heads of the machine applies, evidently, to the whole series of them. Their number and arrangement depend upon the nature and design of the braid (or lace) to be obtained, as is the case in the known braiding-machines. It will therefore, for example, be possible to group a number of heads in a circle round a central head or arrange sidewise one or more additional heads with relation to a circular series of heads.

In the braiding-machine represented in the drawings there is within the hollow bobbin-spindle b (see Figs. 2 and 4) a pipe U, which carries at its upper part a tension-roller u and serves to keep taut the thread carried round it.

The pipe U is closed at the bottom and con-

tains a larger or smaller number of separate weights *v*, which by means of a side opening in the spindle *b* and another in the pipe U can be introduced or withdrawn from the same.

- 5 A pin *w*, which projects into a slot *w'* of the spindle *b*, prevents the dropping out of the pipe U in case the thread breaks. It can be so far pushed back that it permits the taking of the pipe U out of the spindle *b* downward.
10 This arrangement greatly simplifies the changing of the tension of the threads, as it is only necessary to insert less or more weights *v* into the pipe U.

What I claim is—

- 15 1. In braiding-machines, the combination with rotating members for carrying the bobbins through the heads of the machine, of an automatic ball-coupling adapted to temporarily connect the bobbin with one of the said
20 members.

2. In braiding-machines, the combination with rotating plates for carrying the bobbins through the heads of the machine, of an automatic ball-coupling adapted to temporarily
25 connect the bobbin with one of the said plates, and one or more changing members adapted to cooperate with said coupling to transfer the bobbin to the next plate.

3. In braiding-machines, the combination
30 of rotating plates for carrying the bobbins through the heads of the machine, a member having two coupling-balls mounted on the bobbin-spindle, said plates having recesses adapted to receive the balls, a slide arranged
35 to lock one of the balls in a plate-recess and to free the other ball, and one or more changing members arranged in the heads of the machine and adapted to cooperate with the locking-slide so as to cause the same to be displaced in the course of the bobbin movement
40 for the purpose of releasing the locked coupling-ball and engaging the free ball with the next following rotating plate whereby the transferring of the bobbin to the last plate,
45 is brought about.

4. In a braiding-machine, the combination with a series of members for guiding the bobbin-carriers, of automatic ball-couplings for uncoupling the bobbin-carriers from some of
50 such members and coupling them with others, and means controlling the operation of such couplings to vary the pattern of the braid.

5. In a braiding-machine, the combination with a series of members for guiding the bobbin-carriers, of automatic ball-couplings for uncoupling the bobbin-carriers from some of
55 such members and coupling them with others, and a pattern-collar for controlling the operation of such couplings to vary the pattern of
60 the braid.

6. In braiding-machines, the combination with rotating plates for carrying the bobbins through the heads of the machine, of an automatic ball-coupling adapted to temporarily
65 connect the bobbin with one of the said plates,

one or more stationary changing members for said bobbin-coupling, and a controller in connection with such coupling, adapted to cooperate with the changing members to cause or not the reversing of the bobbin-coupling from one rotating plate to the next following one. 70

7. In braiding-machines, the combination of rotating plates for carrying the bobbins through the heads of the machine, a socket member on the bobbin-spindle having two
75 coupling-balls, said plates having recesses adapted to receive the balls, a slide arranged to lock one of the balls in a plate-recess and to free the other ball, one or more changing members, a controlling-collar adapted to be
80 engaged by such members, an engaging lever arranged to be locked by the controlling-collar when the latter is moved, and projections on the machine-heads adapted to be engaged alternately by said engaging lever in
85 the course of the bobbin movement, when such lever has been rocked to one or the other of its operative positions, so as to produce an angular displacement of the slide and to thus control said balls for the purpose of coupling
90 the socket member with the next following plate.

8. In braiding-machines, the combination with rotating plates for carrying the bobbins through the heads of the machine, of a socket
95 member on the bobbin-spindle having two coupling-balls, said plates having recesses adapted to receive the balls, a turnable slide arranged to lock one of the balls in a plate-recess and to free the other ball, one or more
100 stationary changing-pins, a turnable controlling-collar adapted to be engaged by such pins, a curved engaging lever pivoted on the slide and arranged to be rocked by the controlling-collar when the latter is turned, and
105 stationary projections in the machine-heads adapted to be engaged alternately by said curved lever in the course of the bobbin movement, when such lever has been rocked to one or the other of its operative positions, so as to
110 produce an angular displacement of the slide and to thus control said balls for the purpose of coupling the socket member with the next following plate.

9. In braiding-machines, the combination
115 with rotating plates for carrying the bobbins through the heads of the machine, of a socket member on the bobbin-spindle having two coupling-balls, said plates having recesses adapted to receive the balls, a turnable slide
120 arranged to lock one of the balls in a plate-recess and to free the other ball, one or more stationary changing-pins, a turnable controlling-collar adapted to be engaged by such pins, a curved engaging lever pivoted
125 on the slide, a slidable ring embraced by such lever and adapted to be shifted by the controlling-collar when this is turned so as to rock the lever and stationary projections in the machine-heads adapted to be engaged al- 130

ternately by said curved lever in the course of the bobbin movement, when such lever has been rocked to one or the other of its operative positions so as to produce an angular displacement of the slide, and to thus control said balls for the purpose of coupling the socket member with the next following plate.

10. In braiding-machines, the combination with rotating plates for carrying the bobbins through the heads of the machine, of a socket member on the bobbin-spindle having two coupling-balls, said plates having recesses adapted to receive the balls, a turnable slide arranged to lock one of the balls in a plate-recess and to free the other ball, one or more stationary changing-pins, a turnable controlling-collar adapted to be engaged by these latter, a curved engaging lever pivoted on the slide and arranged to be rocked by the controlling-collar when the latter is turned, a vertically-adjustable piece sliding on said collar, adapted to engage the changing-pins when moved to their height, a device for holding such sliding piece in its operative position, and stationary projections in the machine-heads adapted to be engaged alternately by said curved lever in the course of the bobbin movement, when said lever has been rocked to one or the other of its operative positions, so as to produce an angular displacement of the slide and to thus control said balls for the purpose of coupling the socket member with the next following plate.

11. In braiding-machines, the combination with rotating plates for carrying the bobbins through the heads of the machine, of a socket member on the bobbin-spindle having two coupling-balls, said plates having recesses adapted to receive the balls, a turnable slide arranged to lock one of the balls in a plate-

recess and to free the other ball, one or more stationary changing-pins, a turnable controlling-collar adapted to be engaged by the latter, a curved engaging lever pivoted on the slide and arranged to be rocked by the controlling-collar when the latter is turned, a vertically-movable member sliding relatively to said collar, adapted to engage the changing-pins when moved to their height, a collar mounted on the bobbin-spindle and provided with insertible pins to ride upon said movable member and thus to hold it in the operative position, and stationary projections in the machine-heads adapted to be engaged alternately by said curved lever in the course of the bobbin movement, when this lever has been rocked to one or the other of its operative positions so as to produce an angular displacement of the slide and to thus control said balls for the purpose of coupling the socket member with the next following plate.

12. In braiding-machines, a bobbin-carrier having a hollow spindle, a tube contained therein, a tension-roller for the thread carried by such tube on its upper end and a number of small weights contained in the said tube, the latter as well as the bobbin-spindle having openings to allow of the introduction or withdrawal of one or more of said weights, for the purpose of easily regulating the tension of the threads.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JEAN KAPPELER.

Witnesses:

GEO. GIFFORD,
AMAND BRAUN.