

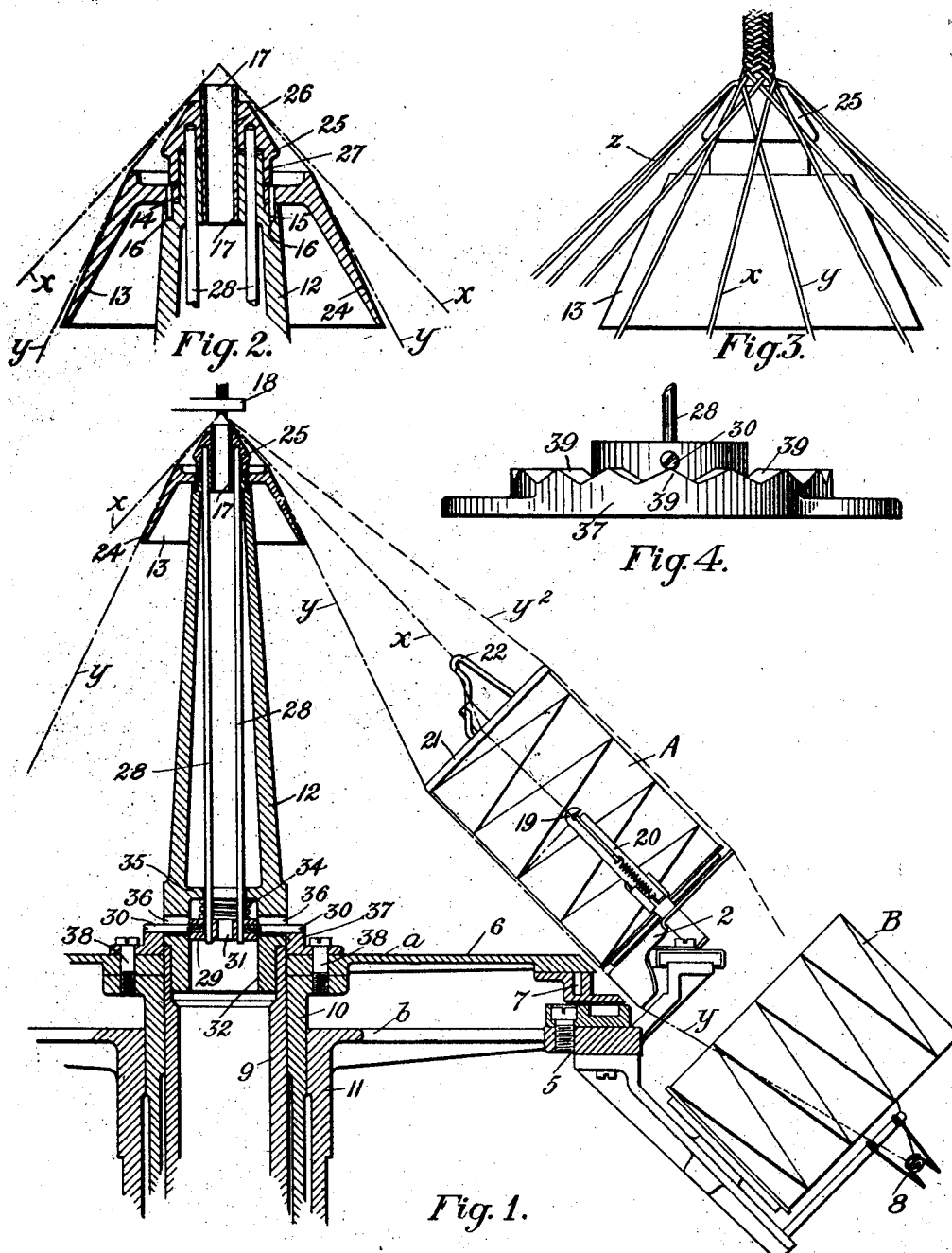
E. F. PARKS & S. W. WARDWELL.

BRAIDING MACHINE.

APPLICATION FILED JUNE 28, 1908.

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BRAIDING-MACHINE. BEST AVAILABLE COPY

1,000,436.

Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed June 26, 1908. Serial No. 440,519.

To all whom it may concern:

Be it known that we, EDWARD F. PARKS and SIMON W. WARDWELL, citizens of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Braiding-Machines, of which the following is a specification.

Our invention relates to improvements in braiding machines and particularly to means for beating up the strands in the fabric at the gathering point.

Our improvement consists in providing means for automatically beating the yarns into their proper positions in the fabric and for so controlling the beating up as to prevent contact of the yarns, except where they merge in the braid.

The invention is fully set forth in the following specifications, illustrated in the accompanying drawings, in which:—

Figure 1 is a sectional elevation of a portion of a braiding machine showing our invention applied thereto; Fig. 2, a sectional detail view of the beating up mechanism; Fig. 3, a detail of the same showing the beater in its raised position; Fig. 4, a detail view of the vibrating mechanism.

Our invention is shown as preferably applied to a machine of the class described in our pending application, Serial No. 350,641 filed Jan. 7th, 1908, in which the yarn supplies are arranged in two tiers revolving in opposite directions about the axis of the machine. The yarns from the upper tier lead directly to the braiding point and the yarns from the lower tier are manipulated to pass them alternately inside or outside of the supplies of the upper tier. The present invention relates particularly to the beating up mechanism which controls the relation of the yarns at the braiding, or gathering point, and it will be evident that the device might be applied to other forms of machine than that here shown.

As illustrated in Fig. 1 and described in our pending application above referred to, the upper supplies A are supported on carriers 2, which revolve about the machine on a circular track formed of arcal sections between which are openings to permit the yarns from the lower supplies being deflected radially inward and outward to pass them by said carriers. The lower yarn supplies B are carried on spindles supported on

the rotating drum or head 5. Each carrier 2 is connected to the rotating plate 6 by a driver, not here shown, which is preferably of arcal form held in a groove 7 and arranged to oscillate to engage the carrier first by one and then by the other, so that the yarns from the lower supplies B may pass between the carriers and their driving plate 6.

As shown in Fig. 1, the supplies A and B are arranged with their axes inclined to the vertical axis of the machine. The axes of the upper supplies A incline toward the axis of the machine and converge at the theoretical gathering point of the yarns and the lower supplies B are arranged with their axes at right angles to those of the upper supplies. The relation of the two sets of supplies is such that when one of the supplies A registers with one of the supplies B the axis of the former, if extended downward, will bisect the longitudinal dimension of the supply B. This provides that the yarn y which draws through a guide eye 8, arranged midway of the ends of the supply package B, will be deflected a distance of one-half the diameter of the supply package A to pass it by, either inside or outside of the supply A. In other words, the yarn y is deflected an equal distance whether passing radially inside or outside the supply A.

Referring again to Fig. 1, 9 indicates the central vertical post or upright bearing which is the material axis of the machine on which the heads a and b rotate. The head a comprises the plate 6 and the tubular bushing 10 bearing on the post 9, and the head b has a tubular bushing 11 bearing on the outside of the bushing 10. Secured in the top of the post 9 is a vertical support 12, formed hollow and tapering toward the top, and on this is mounted a flaring, bell-shaped abutment 13. The abutment 13 is forced on to a reduced portion 14 of the support 12 (see Fig. 2) abutting the shoulder 15 and held by suitable dowel pins 16. Within the bore of the support 12 is fastened a tube 17, providing an opening for the passage of the wire or other material to be covered by the strands in the braiding process. The yarns from the several supplies draw across the upper edge of the tube 17 and above the tube is a ring or plate 18 through which the braid feeds, and these two elements regulate the point at which the

yarns merge in the braid. It will be understood that without such an arrangement the braiding point would vary in position according to the speed of take-up and the tension on the yarn. In other words, when the take-up is operating at a comparatively slow speed, or when the yarns are delivered from their supplies under heavy tension, the braiding point will be relatively lower than when the take-up speed is fast or the tension light, and vice versa. The object of the arrangement above described is to establish a fixed point of convergence for the yarns so that they may be acted upon at the braiding point by the beater device, to be later described.

The yarns x from the upper supplies A lead through the eye 19 of the tension controlling device 20, which need not be here described in detail as it forms the subject matter of a separate application, draw across the edge of the cap 21 which surmounts the supply and thence through a guiding loop 22. The guiding loop 22 is arranged eccentric to the axis of the supply A to direct the yarn in such a course that it will clear the top of the abutment 13 when drawing across the edge of the tube 17. The yarns y , from the lower supplies B, as they pass under the upper supplies A bear on the top edge of the abutment 13, but the flaring face 24 of the abutment is preferably so formed that it clears the yarns. It will be seen that the abutment 13 deflects and raises the yarns y so that they are directed to the braiding point at substantially the same angle as the yarns x ; but it is also pointed out that there is a slight clearance between the two yarns at the point where the yarns y draw across the edge of the abutment 13. This provides that should a knot occur in either one of the yarns it would clear the adjacent yarn in passing over or under it, Fig. 3 showing the manner in which one set of yarns y pass under the other set x . In Fig. 1, the dash line y^2 represents the course of the yarn from the lower supply as it passes over the yarn x , showing the clearance between the two yarns in this relation to provide for the passing of knots.

The vibrating beater consists of a conical thimble 25 having its upper edge slightly rounded off, and formed with a bore 26 which fits the tube 17 and a counter-bore 27 adapted to the turned-down portion 14 of the support 12, (see Fig. 2). Two wires 28, 28, with their ends driven into bores in the thimble 25, extend downward through bores in the top of the support 12 and are fastened in a collar 29, at the bottom of the support, by the screw-threaded pins 30, 30. The collar 29 has a central bore 31 for passage of the wire or other material to be covered by the braid, and is adapted

to slide up and down in the bore 32 of the support 12. A coiled spring 34 is located between the collar 29 and a web or flange 35 on the inside of the support 12, tending to maintain the collar in its lowermost position. The pins 30, 30 project through slots 36 in the wall of the support 12 and engage the face of a cam 37 which is secured to the head a by the screws 38, 38 which also fasten the plate 6 to the bushing 10. The screws 38 extend through slots in the cam 37 allowing the cam 37 to be adjusted rotatively in respect to the supplies A and B, to time the action of the cam with the passing of the supplies of one set past those of the other. The cam 37, (see Fig. 4) is formed with V-shaped projections 39, which equal in number the whole number of supplies A and B on the machine—in this case sixteen. The support 12 is fast in the post 9, as previously explained, and remains stationary with it, while the cam 37 rotates with the head a . The pins 30, 30, through their engagement with the slots 36, prevent the rotation of the collar 29 and the projections 39 on the cam 37, acting on the pins, cause the collar 29 to reciprocate up and down. This reciprocatory movement is transmitted to the thimble or beater 25 by means of the wires 28, causing it to move up and down on its bearing on the tube 17. Fig. 2 shows the beater in its lowermost position and Fig. 3 illustrates it in its raised position.

The operation of the device is as follows: As the two heads a and b rotate in opposite directions the two sets of supplies A and B are likewise caused to revolve about the axis of the machine. The yarns from both sets of supplies are drawn up across the edge of the tube 17 and merge in the braid at a point midway between the end of the tube and the ring 18. A suitable take-up device, not here shown, is provided to feed the fabric along as fast as the strands are intermeshed and if it is required to braid the fabric surrounding wire or other material, for a covering, the material is led up through the center of the support 12, fed through the tube 17 and taken up by the take-up mechanism. The yarns y from the lower supplies pass over and under the yarns x from the upper supplies and the beater 25 is caused to reciprocate up and down to engage the yarns at their crossing points and press them into the fabric. It will be understood that the yarns y , of which there are eight, cross the yarns x , also eight in number, sixteen times during one revolution of the machine. This occurs because both sets of supplies revolve at the same time. If only one set of supplies revolved and the other remained stationary there would be but eight crosses in one revolution, but with the machine operating as described each yarn y passes over and

under each yarn x during one revolution of the machine. It will therefore be seen that in order to engage the pairs of yarns each time they cross, the beater must be lifted sixteen times during one revolution of the machine and this is provided for by the sixteen points or projections on the cam 37. Referring to Figs. 2 and 3, there will be eight crosses of the yarns around the edge of the tube 17 at certain intervals of the braiding, and as this occurs sixteen times during one revolution of the machine, the cam 37 is so timed to rise to the top of the tube 17 and press the crossed yarns into a firm contact in the fabric. The yarns y as they pass under the yarns x draw across the rim of the abutment 13 with a slight clearance between each pair of yarns. There is a slight drag of the yarn y on this edge, however, so that when the yarn y is in the position indicated in Fig. 1, in relation to the supply A, it will not have reached a point on the rim of the abutment 13 radially in line with the yarn x ; but as the yarn y follows along around the rim the beater 25 rises, so that when the two yarns are crossed at or near the rim they are both raised, and the under yarn freed from contact with the abutment. In other words, both yarns are lifted by the beater so that neither one bears on the rim of the abutment 13 when they cross adjacent the rim. This is shown and indicated at z , Fig. 3. It will now be evident that the beater 25, besides serving to mat the strands into the fabric, has this added function of relieving the yarns y from contact with the abutment 13 when the yarns are crossed in line with the rim of the abutment, the object being to prevent knots in one yarn catching and dragging on the other. Stated briefly: the yarns are not positively controlled or guided at their crossing points except where these crossing points enter the fabric, so that the passage of knots is not hindered.

It has been found that the use of this arrangement for beating up the strands results in a much more even and closer fabric and the controlling of the yarns at the crossing points prevents chafing of the yarns or breakages when knots occur.

Although we have described our device in detail with the preferred form and arrangement of parts, and as applied to a certain type of machine, it will be evident that modifications in the structure and application of the mechanism might be made which would come within the scope of this invention, and, therefore, we do not limit ourselves to the precise construction shown, but

What we claim is:

1. In a braiding machine, the combination with two sets of supplies revolving in opposite directions, and means to pass the yarns from one set of supplies over and

under the yarns from the other set, or means to regulate the braiding point of the yarns, comprising an element 17 over which the yarns draw, a stationary abutment 13 below the said element 17, arranged to support the yarns of one set, and a vibrating thimble 25 operated intermittently to raise the yarns of this set away from the said abutment in the manner and for the purpose described.

2. In a braiding machine, the combination with two sets of supplies revolving in opposite directions, and means to pass the yarns from one set of supplies over and under the yarns from the other set, of means to regulate the braiding point of the yarns including a fixed element across and over which the yarns draw, and a reciprocating thimble adapted to be intermittently operated to raise the yarns from said element to press them into the fabric.

3. In a braiding machine, the combination with means for interlacing the yarns, of means to regulate the gathering point of the yarns consisting of fixed elements arranged in juxtaposition, and a vibrating element operated intermittently to raise the yarns clear of one of the fixed elements to press them into the braid.

4. In a braiding machine, the combination with means for interlacing the yarns, of means to beat the strands into their proper positions in the fabric, comprising two fixed limits to control the gathering point of the yarns and a vibrating element operated intermittently to force the yarns away from one limit toward the other.

5. The combination in a braiding machine with two sets of yarn supplies carried on oppositely rotating heads, of means to interlace the yarns from the two sets of supplies, a fixed means to regulate the braiding point of the yarns within certain limits, and means operated automatically by the rotation of the heads to intermittently engage the yarns at predetermined intervals when the yarns cross at points at a distance from the braiding point to force the crosses up toward the fixed limit and beat them into the fabric.

6. The combination in a braiding machine with two sets of supplies carried on oppositely rotating heads, and means to interlace the yarns from the two sets of supplies, of a fixed element across the top of which the yarns draw in leading to the braiding point, and means adapted to be reciprocated intermittently to lift the yarns from the fixed element so that knots in the yarn will not be obstructed where the yarns cross, but will pass into the fabric.

7. The combination in a braiding machine with means to interlace the yarns, of a beater mechanism comprising two fixed elements between which the braiding point is

limited, and a reciprocating element operated synchronously with the interlacing means to engage the yarns at the proper intervals to beat the crosses of the yarns into the fabric without contact of the yarns, one with another, except where they merge in the braid.

8. The combination in a braiding machine with two sets of supplies carried on oppositely rotating heads, of means to interlace the yarns from said supplies, a fixed means adapted to gather the yarns together at a definite point to regulate their point of interlacing, means to direct the yarns at approximately the same angle to the braiding point with one set of yarns having a slight clearance between the yarns of the other set where they cross, and reciprocating means operated from the rotation of the heads to intermittently engage the yarns at intervals with their crossing to raise the yarns at their crossing points and beat the crosses into the fabric.

9. The combination in a braiding machine with two sets of supplies and means to interlace the yarns from the two sets of supplies, of an abutment 13 arranged below the braiding point of the yarns and formed with a rim adapted to support one set of yarns, and a beater 25 operated intermittently and so timed with the braiding mechanism as to raise the yarns free from the abutment 13 when the yarns cross at a point adjacent the rim of the abutment.

10. The combination in a braiding machine with means for interlacing the yarns, of a tube supported below the braiding point and arranged with the yarns drawing across its edge, a thimble 25 arranged to slide up and down on the tube and means operated by a going element of the machine to reciprocate the thimble.

11. The combination in a braiding machine with means for interlacing the yarns of a vertical support at the axis of the machine, a tube fastened in the top of the support, a thimble adapted to slide on the tube and means to reciprocate the thimble.

12. The combination in a braiding machine with two sets of supplies revolving about a central post, of a vertical support secured in said post and arranged with the shed of yarns drawing across its upper edge, a reciprocating thimble at the top of said post, and means to reciprocate said thimble to intermittently lift the yarns away from the support to free them at their crossing points so that a knot in one of the yarns will not be hindered from passing over or under an adjacent yarn.

13. In a braiding machine, the combination with two heads rotating about a central post and carrying two sets of yarn supplies, of a vertical, hollow support extending from a post, a collar adapted to be reciprocated up and down within the support,

means on one of the heads to reciprocate the collar, and a thimble sliding on a bearing at the top of the support and connected with the collar.

14. The combination in a braiding machine with two sets of supplies supported on rotating heads, of a central support on the machine, a vibrating collar within the support, a cam on one of the heads, pins extending from the collar through slots in the support and engaging the cam and thimble sliding on a bearing at the top of the support and connected with the collar.

15. In a beater device for braiding machines, the combination with a rotating member of the machine of a cam thereon formed with teeth on its face, a reciprocating member having elements to engage the cam face, and a beater connected with said member and reciprocated thereby.

16. The combination in a braiding machine with rotating heads and two sets of yarn supplies carried thereby, of a vertical support extending above the heads, a bearing at the top of said support, a thimble 25 adapted to slide on said bearing, an abutment 13 below the thimble adapted to support the yarns from one set of supplies, a cam on one of the heads and means connecting the thimble with the cam to reciprocate the thimble to beat the yarns into the fabric.

17. In a braiding machine, the combination with two sets of yarn supplies carried by oppositely rotating heads, and means to pass the yarns from one set of supplies over and under the yarns from the other set, of a central support 12, a conical abutment 13 on said support, adapted to support and direct the yarns to the braiding point, a tube 17 across the edge of which the yarns draw, a thimble 25 adapted to reciprocate on the tube 17, a cam 37 rotating with one of the heads and arranged to reciprocate the thimble 25 at each crossing of the yarns of one set over or under the yarns of the other set.

18. In a beater mechanism for braiding machines, the combination with a vertical support 12, a tubular bearing 17 at the top of the support, a thimble 25 adapted to slide on said bearing, a collar 29, rods 28 connecting the thimble with the collar, a cam 37 adapted to be rotated from the machine, and means on the collar to engage the cam.

19. In a beater mechanism for braiding machines, the combination with a vertical, hollow support 12, a thimble 25 adapted to reciprocate on said support, a collar 29 adapted to slide within the support, pins 30 projecting from the collar through slots in the walls of the support, a cam 37 formed with a toothed face adapted to engage the pins, and rods 28 connecting the collar 29 with the thimble 25.

20. The combination in a braiding machine with two oppositely rotating heads, two sets of yarn supplies carried by said heads, and means to interlace the yarns from
5 the two sets of supplies, of a beating mechanism comprising a vibrating element 25, a cam 37 secured to one of the heads and rotatively adjustable in relation to the supplies, and means to connect the element 25 with
10 the cam 37 to cause the reciprocation of the

former in the manner and for the purpose specified.

In testimony whereof we affix our signatures in presence of two witnesses.

EDWARD F. PARKS.
SIMON W. WARDWELL.

Witnesses:

CHAS. A. EDDY,
FRED C. POTTER.