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

BRAIDING MACHINE.

APPLICATION FILED AUG. 2, 1907.

939,622.

Patented Nov. 9, 1909.

3 SHEETS—SHEET 1.

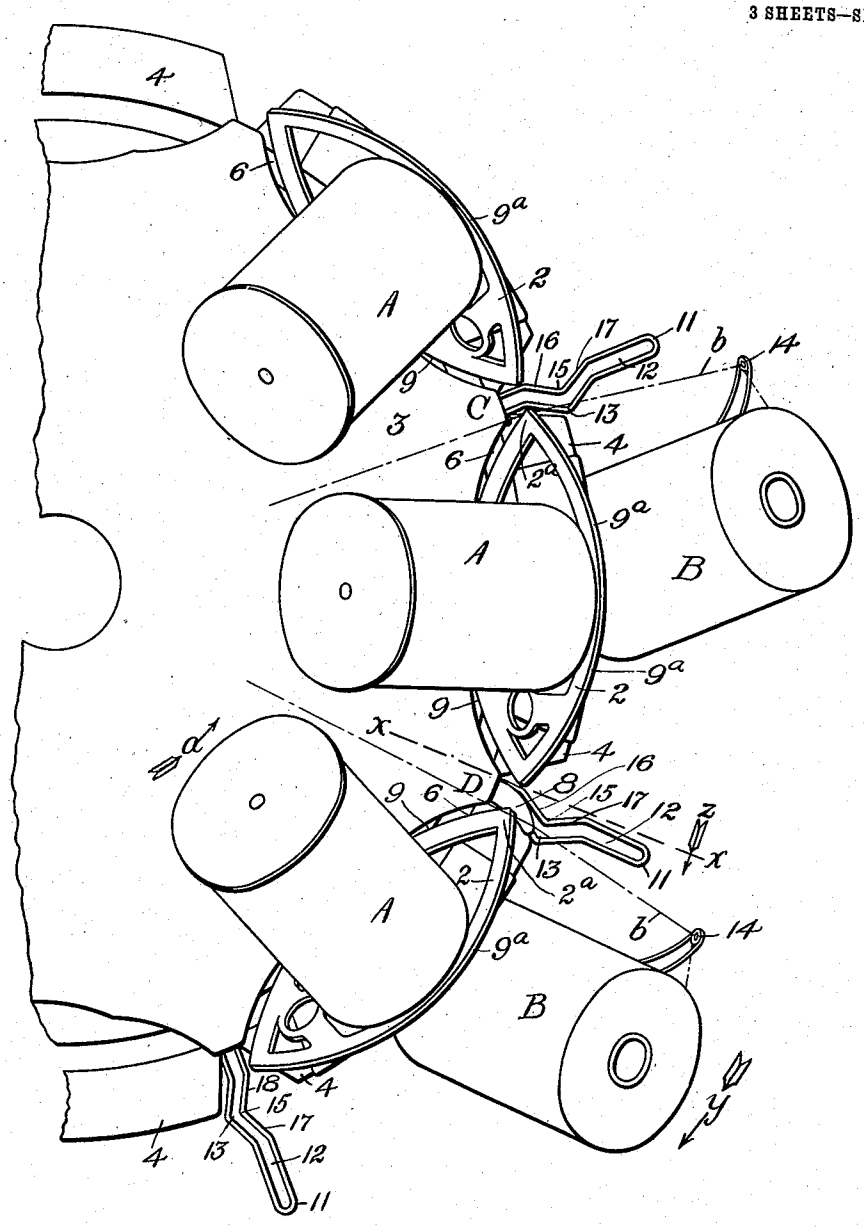

Fig. 1.

WITNESSES

C. W. Naylor

J. J. McCarthy

INVENTORS

E. F. Parks & S. W. Wardwell

BY Foster Freeman Watson & Coit

ATTORNEYS

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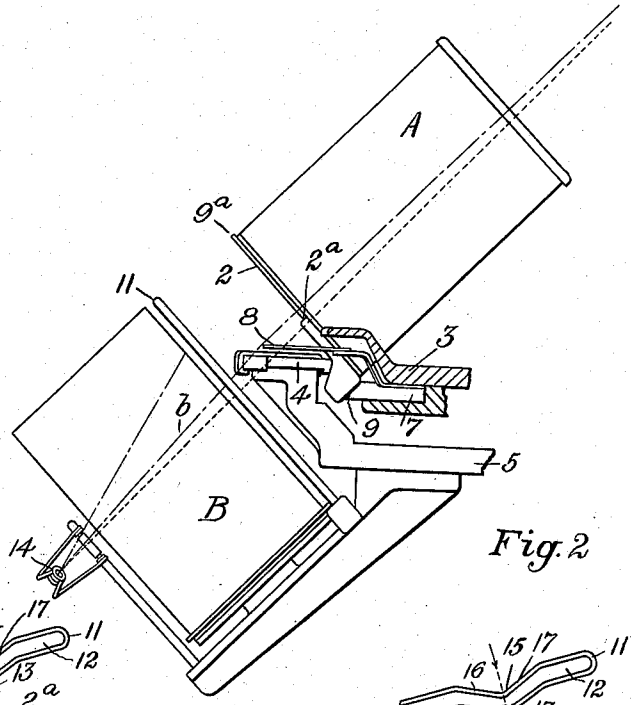

Fig. 2.

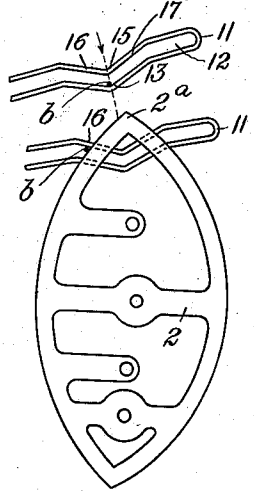

Fig. 4.

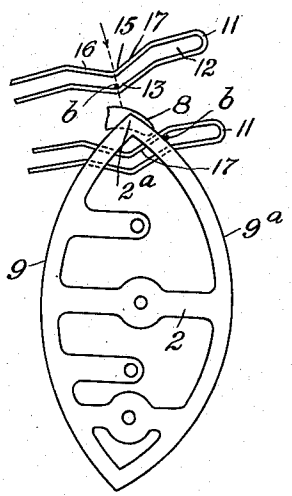

Fig. 5.

WITNESSES

C. H. Traylor.

J. J. McCarthy

INVENTORS

BY E. F. Parks & S. W. Wardwell

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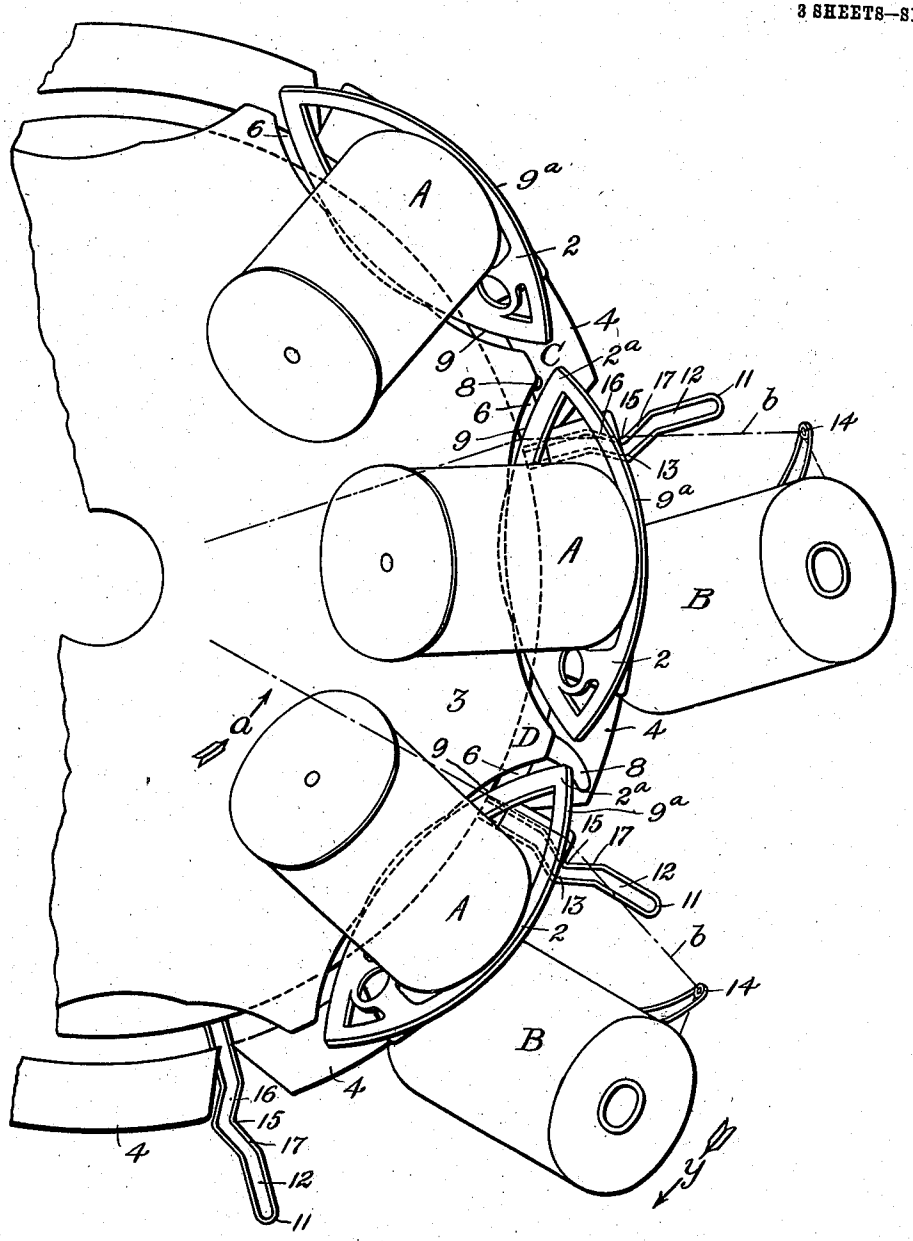

Fig. 3.

WITNESSES

C. H. Traylor

J. J. McCarthy

INVENTORS

BY E. F. Parks & S. W. Wardwell

Foster Freeman Watson & Coit

ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD F. PARKS AND SIMON W. WARDWELL, OF PROVIDENCE, RHODE ISLAND.

BRAIDING-MACHINE.

939,622. Specification of Letters Patent. Patented Nov. 9, 1909.

Application filed August 2, 1907. Serial No. 386,813.

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 braiding machines and particularly to that class of machines shown and described in our United States Patent No. 851204, issued April 23, 1907, and in our pending application, Serial No. 250641, filed Jan. 3, 1907. In this character of machine the yarns from the lower supplies are caused to travel a sinuous course around the upper supplies, and our improvement relates to the means for guiding and easing the yarns over or under the carriers which support the upper supplies.

The invention is fully set forth in the following specification, illustrated by the accompanying drawings, in which:

Figure 1 is a plan view of a portion of our braiding machine showing the relation of the yarns to the carriers; Fig. 2, a detail elevation, part sectional on the line *x*—*x*, Fig. 1, looking in the direction indicated by the arrow *z*; Fig. 3, another plan view showing the carriers slightly advanced from the position shown in Fig. 1; Figs. 4 and 5, diagrammatic views showing the coaction of the yarn guides with the edges of the carriers.

A—A, etc., represent the upper yarn supplies which are supported and carried by the carriers 2, the latter disposed in pockets in the edge of the head or driving plate 3, from which they are driven. The driving plate 3 rotates in the direction indicated by the arrow *a*, carrying with it the carriers 2 which travel or slide on the sectional rail or track 4. The track sections 4—4, etc., are supported on a driving head 5—see Fig. 2—which also carries the lower supplies B—B, etc., and rotates in the opposite direction to that of the plate 3, as indicated by the arrow *y*.

Between the carriers 2 and the driving plate 3 are slits 6 for the passage of the yarns *b*—*b*, etc. from the lower supplies, and the carriers are connected to the driving plate 3 by means of oscillating drivers 7 herein shown only in Fig. 2, preferably arranged as described in our patent and pending application above referred to. These drivers engage the carriers first by one end and then by the other, to allow the passage of the yarn past their driving points and, as described in connection with our other machine, the drivers are arranged to operate switches 8 which automatically close or open the entrances to the slits 6, thereby determining the path of travel of the lower, sinuating yarn.

As further explained in our previous patent, the yarns from the lower supplies are led up to the braiding point from guides 14 which determine the normal position of the yarns in relation to the carriers. These guides provide that the radially mean path of the yarns *b* shall, fall just within the points or nose ends 2^a of the carriers 2, as shown by dotted line Fig. 2, so that the yarns *b* would normally pass through the slits 6 on the inside of the carriers. To cause the yarns to pass on the outside of the carriers, the switches 8 are projected outward from the driving plate 3 to deflect the yarns *b* onto the outer edges of the carriers.

The carriers 2 are preferably of lenticular form, so that the yarns in bearing on their edges 9 and 9^a are further deflected radially inward or outward to pass them by the upper supplies A. The present invention contemplates means for assisting this deflection of the yarns by the carriers, and consists of devices to act in conjunction with the edges of the carriers in wedging the yarns radially inward or outward.

For the sake of clearness, the yarns from the supplies A are not here shown, since their arrangement does not affect the present invention.

Above each supply B is provided a guide 11 for the yarn *b*, which revolves with the lower supplies and holds the yarn *b* to the points of the carriers while allowing radial movement of the yarn under the influence of the carriers' edges. In our previous machines referred to, these guides were shown and described as having straight, radially disposed slots in which the yarn played, but the present invention comprises improvements in the form and arrangement of the slots in the guides.

The guides 11 are preferably formed of wire, bent double to provide the two sides of the slot and, as now provided, the slot 12 takes a V-shape at a point approximately midway of its ends, forming a guide crotch 13 and an opposed wedge formed abutment

15. The crotch 13 of the slot 12 is so positioned relative to the carriers 2 that the yarn drawing from the supply B through the eye 14 will locate in this crotch in its normal position. The guide eye 14 is preferably a part of the tension and let-off device for the supply B, but these parts not being essential to the present invention are not here shown.

Fig. 1 shows the upper and lower supplies in such relation that the yarns *b* from the lower supplies are just entering into engagement with the leading ends or points of the carriers 2. At C the slit 6 is shown open, and the yarn *b* is entering the slit and bearing on the inner edge of the carrier. At D the switch 8 is shown closing the entrance to the slit 6 and deflecting the yarn *b* onto the outer edge of the carrier 2. As the yarn *b* leaves the rear end of the carrier around which it has just passed, the yarn will be drawing across the crotch 13 of the guide 11, but as the yarn meets the deflecting edge of the carrier, it is raised out of the crotch and forced over onto the opposite side of the slot 12. That is, the yarn *b* will be deflected from the crotch 13 to the point 15. Fig. 1 represents the yarns as just being raised out of the crotches in the guides 11: in one case, at C, through the deflection of the yarn by the inner edge of the carrier, and in the other, at D, by the combined deflection of the outer edge of the carrier and the switch 8.

Fig. 3 shows the supplies in such relation that the yarns *b* are advanced part way around the edges of the carriers 2, and in this position the purpose of the V form of the guides 11 is made apparent. At C, it will be observed that the yarn *b* is deflected by the carrier over on to the inclined face 16 of the guide 11, and it is obvious that this incline will have a wedging influence on the tensioned yarn, tending to carry it radially inward and thus assisting its passage over the arched edge 9 of the carrier 2, (see Fig. 4). At D, the yarn *b* is shown deflected onto the incline 17 of the guide 11, the tendency of which is to force the yarn radially outward to ease its passage over the outer edge 9^a of the carrier 2, (see Fig. 5).

While the guide 11 is shown as preferably made from wire, its substance and precise form, arrangement and mode of application are not limited. Other expedients for performing the same function readily suggest themselves to the trained mechanic.

The guide 11 might be made completely V-shaped from one end to the other, but it has been found preferable to shape it as shown, with a part of its slot straight and radially disposed. This allows a sharper angle at the bend of the slot which has a greater wedging or deflecting tendency and provides the maximum lifting effect as the yarns strike the more abrupt rise on the edge of the carrier near the latter's point. After the yarn has been eased over the hard part of this edge, it requires no further assistance and simply plays in the straight portion of the slot.

In brief recapitulation: The yarns *b* lead from the supplies B through the guide-eyes 14 and thence up through the crothes 13 of the guides 11 to the braiding point where they are gathered together with the yarns from the upper supplies to form the fabric. The yarns *b*, with their supplies, are revolving in the direction indicated by the arrow *y*, and at certain intervals meet the points of the carriers 2 which revolve in the opposite direction, indicated by the arrow *a*. The yarns are engaged by the inner edges of the carriers or deflected onto the outer edges alternately, or according to the character of the fabric, as before described, and such engagement deflects them from the crotches 13, over to the opposite edges of the slot 12. If a yarn is bearing on the inner edge 9 of the carrier, it will be deflected to the inclined edge 16, and this engagement or bearing on the guide 11 holds the yarn to the edge of the carrier, at the same time wedging or lifting it around the bulge in said edge. When the yarn draws across the outer edge 9^a of the carrier, it is deflected to the incline 17 of the guide 11, and is thereby eased over the outer bulge of the carrier's edge.

The yarn *b* is given its extreme radial deflection at the center of the carrier, and after passing this point, the deflecting tendency is relieved and the yarn returns under its normal tension to its mean radial position, drawing through the crotch 13, being now properly disposed to be acted upon by the point of the next succeeding carrier.

It will be realized that this invention shows important improvement, in that it provides for a minimum resistance to the yarns in passing them around the carriers and hence allows greater speed of operation of the machine with less breakage of the yarns and less chafing or abrasion, therefore tending to improve the product.

Having now described the arrangement and mode of operation of our device, what we claim is:

1. In a braiding machine, the combination of two sets of yarn supplies, carriers to carry one set of supplies, means to pass the yarns from the second set of supplies to either side of the carriers and guides to act with further deflecting effect on the yarns in their passage by the carriers, as described.

2. In a braiding machine, the combination of two sets of yarn supplies, carriers for one set of supplies formed with edges of lenticular form, deflecting means for deflecting the yarns to different side edges of the carriers and guides below the carriers to act with

their lenticularly formed edges in deflecting the yarns from the other set of supplies in their passage by the first set.

3. In a braiding machine, the combination of two sets of supplies revolving in opposite directions, carriers for one set of supplies, with lenticularly formed edges, deflecting means for alternately carrying the yarns in position to contact with different edges and guides below the carriers revolving in the opposite direction from the carriers and cooperating with the lenticularly formed edges of the carriers in deflecting the yarns in their passage about the supplies on the carriers.

4. In a braiding machine, the combination of two sets of supplies revolving in opposite directions, carriers for one set of supplies, and guides revolving in the opposite direction from the carriers and formed with V-shaped slots coacting with the carriers to guide the yarns around the carriers in the manner and for the purpose specified.

5. In a braiding machine, the combination of revolving carriers carrying one set of yarn supplies, a second set of yarn supplies revolving in a direction opposite to that of the carriers means for deflecting their yarns to different sides of the carriers, and guides revolving with the second set of supplies, each formed with a slot having reversely inclined faces that coact with the carriers in passing said yarns about the latter as described.

6. The combination with the revolving carriers of a braiding machine and the oppositely revolving lower yarn supplies, of guides for the lower supplies formed with radially disposed slots having V-shaped portions arranged in the manner and for the purpose specified.

7. The combination in a braiding machine with a set of revolving yarn supplies and deflecting means for sinuating the course of the yarns drawn from said supplies, of auxiliary guides revolving with said supplies, formed with V-shaped slots adapted to normally receive and direct the yarns to draw through the crotches of said slots and, by their inclined faces, to also aid in deflecting the yarns in passing them by the carriers.

8. The combination in a braiding machine with two members rotating in opposite directions and two sets of revolving yarn supplies, one set revolving with each member, of means to sinuate the course of the yarns from one set of supplies to pass them alternately over and under those of the other set, and auxiliary deflecting guides having a fixed relation to the yarns of one set to assist the sinuating means in deflecting said yarns.

9. In a braiding machine, the combination with two sets of yarn supplies, carriers to carry one set of supplies and means to drive the carriers, of means to deflect the yarns from the second set of supplies to either side of the supplies of the first set, and guides to control, the yarns in relation to the carriers, said guides formed with crotches to regulate the normal position of the yarns and inclined faces acting in conjunction with the carriers to deflect the yarns radially inward or outward from their normal position.

10. A thread guide for a braiding machine formed with a crotch for maintaining a traveling thread in its radially mean path, and with a wedge-shaped portion opposing said crotch to act with deflecting effect on the said thread.

11. In a braiding machine, the combination with two series of yarn supplies and means for revolving the two series in opposite directions, of two different deflecting means revolving in opposite directions to each other and arranged to coact to radially deflect the yarn from one series of supplies, first in one direction and then in the opposite direction.

12. In a braiding machine, the combination with a carrier and thread guide having a wedge-shaped abutment, which carrier and abutment normally coact to cause a traveling yarn to pass radially inward by the carrier, of a switch to deflect the traveling yarn from its radially mean path, so that it is engaged by the outer edge of the carrier and said wedge-shaped abutment, to pass radially outward around the carrier.

13. In a braiding machine, the combination with a thread guide having a crotch to hold a traveling yarn to its radially mean position and an opposed wedge-shaped portion, of a carrier to engage and withdraw the traveling yarn from said crotch of the guide, and force it into engagement with the wedge-shaped portion aforesaid, to coact therewith to deflect the yarn from its normal path of travel.

14. In a braiding machine having traveling carriers and means for supporting yarn supplies thereon, a second set of supplies supported below the first, means for revolving the two sets in different directions, and means for radially deflecting the yarn of the second set alternately inside and outside the different carriers, and guides with inclined deflecting edges each arranged to facilitate the radial movement of the yarn in the direction in which it is first started.

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

EDWARD F. PARKS.
SIMON W. WARDWELL.

Witnesses:
CHAS. A. EDDY,
ARTHUR I. HARVEY.