April 17, 1934. E. K. STANDISH 1,955,206

BRAIDING MACHINE

Filed March 8, 1933 2 Sheets-Sheet 1

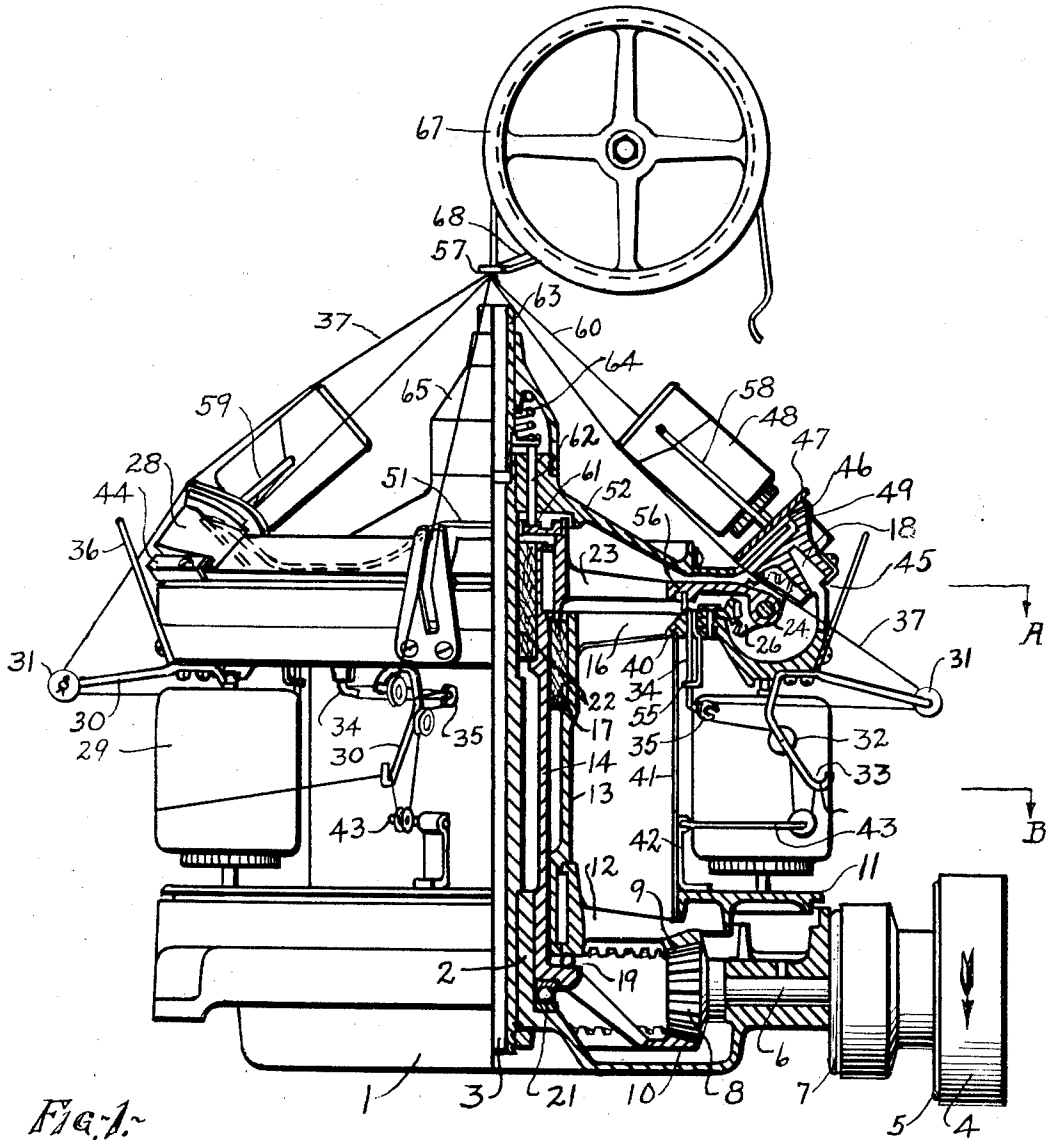


FIG. 1.

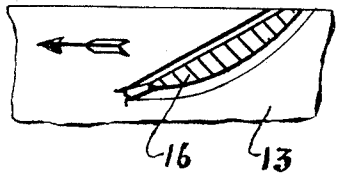


FIG. 2.

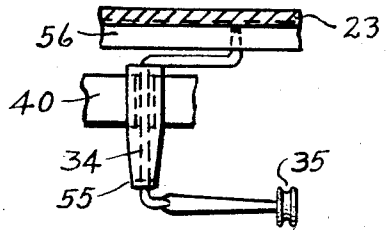


FIG. 3.

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BRAIDING MACHINE

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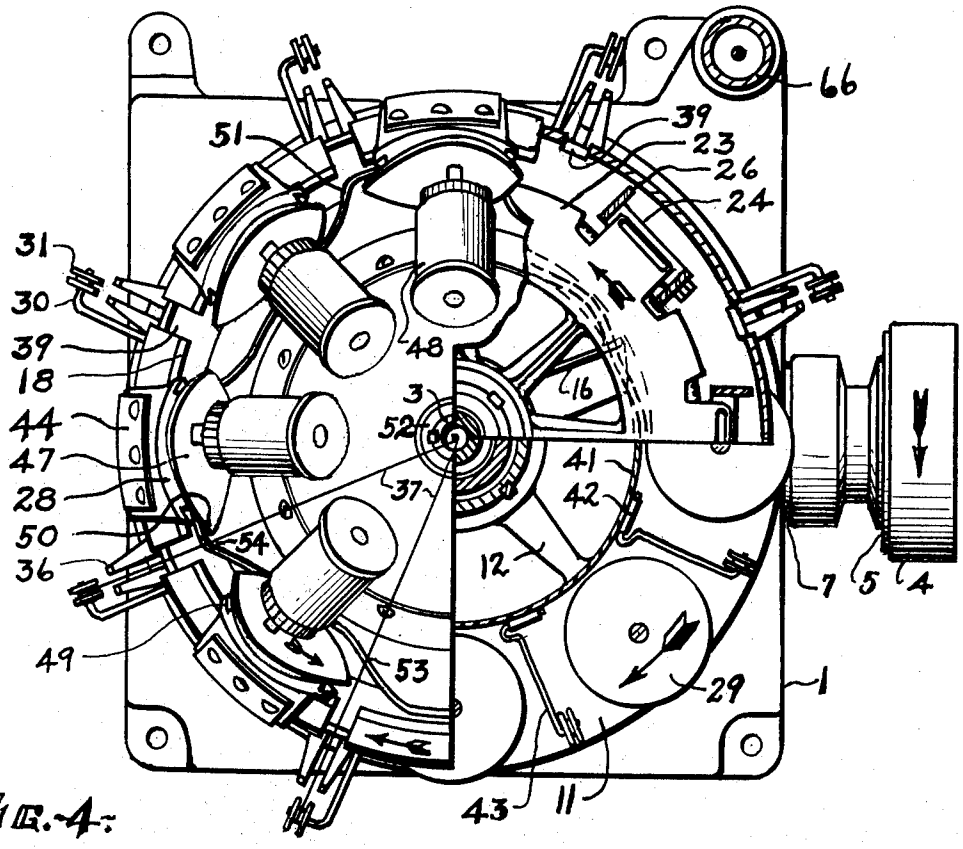


FIG. 4.

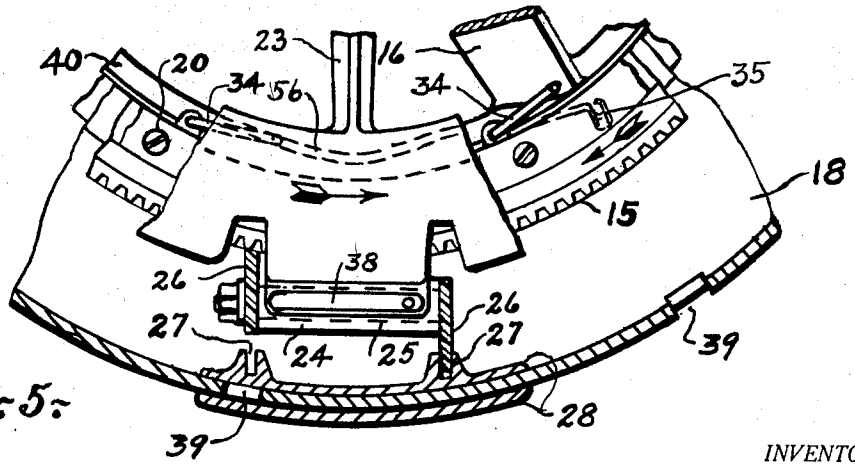


FIG. 5.

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UNITED STATES PATENT OFFICE

1,955,206

BRAIDING MACHINE

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Application March 8, 1933, Serial No. 660,013

13 Claims. (Cl. 96—5)

This invention relates to an improved braiding machine of the rotary or circular orbit type where yarn from one set of supplies is passed either inside or outside of a second set of supplies as required to braid, and where both sets of supplies rotate in opposite directions about a common center.

More specifically, the invention discloses a braiding machine of simple compact construction which combines the features of the rotary disc drive for the upper or inner yarn supply carriers, described in my Patent #1,888,477, issued Nov. 22, 1932, with positively actuated means for varying the length of yarn between the braiding point and an outer yarn guide having a fixed position with reference to the outer carrier, and thus maintaining a uniform tension in this yarn as it either hangs straight or as it is deflected by the passage in the opposite direction of an inner supply carrier, this without the use of a spring, which tends to snap a weak yarn when operating at high speed.

This combination of a rotary disc drive and a length compensating lever or yarn guide positively controlling at all times, by a very small cam movement, the amount of yarn between the braiding point and the fixed yarn guide, permits a considerably higher speed of rotation than where a reciprocating drive and a spring compensating device are used.

These important features are further combined with a horizontal outer carrier providing room for extremely large outer or lower yarn supply packages located as close to the center of rotation as their size permits and carrying a vertically movable spring pressed lever which controls by suitable means, not shown, the let-off of the yarn supplies and the stopping of the machine if the yarn breaks; also, an inclined raceway on which are mounted the inner or upper yarn package carriers located above the outer supplies and inclined to the braiding point at an angle which secures the minimum diameter for the moving parts while also obtaining a tightly braided product; also, an annular trough preferably forming part of the inclined raceway and located below the inner carriers and their disc drives to protect the lower yarn packages from oil and dirt; also, a stationary top plate carrying yarn deflector guide plates located above the inclined raceway and the bodies of the inner carriers and below the yarn guide plates which form the top of said carriers and which carry the inner supply packages, thus by the close location of these guide plates providing a positive control of yarn having considerable slack; also, a fan adapted to cool the disc drive and to free the machine of lint where it may cause clogging and to prevent this lint from reaching an oil reservoir located in the base and in which is located the main drive gears.

Suitable means are also disclosed for preventing oil being thrown from this reservoir when the machine rotates at high speed; also, a beater is shown adapted to assist in securing a tightly braided product and located above the stationary top plate and reciprocated by the movement of a cam rotating with the inner supply carrier.

While some of these features are old the combination disclosed herewith provides an extremely simple, durable, compact, and speedy braiding machine, having a high speed rotating make and break mechanism for driving the inner carriers, an equalizing or compensating device independent of springs for the yarn from the outer supplies, very large yarn packages located close to the center of the machine, stationary yarn deflector guides located below but close to the inner carrier yarn guide plates, the elimination of all steep cams which tend to prevent high rotating speeds, as the equalizing lever cam requires only about one-eighth inch movement and the equalizing lever is of very light weight, and a braider occupying less floor space when considered with reference to the size of the yarn packages than is possible when the outer supplies are not entirely below the inner carriers.

The invention as specifically shown is hereinafter described with reference to the accompanying drawings in which:—

Fig. 1 is an elevation partly in section.

Fig. 2 is a sectional view of the fan arm.

Fig. 3 is a side elevation of the outer supply yarn equalizing lever.

Fig. 4 is the top view with the right half showing sections taken approximately at elevations A and B Fig. 1.

Fig. 5 is an enlarged plan view of the inner carrier disc drive and equalizing lever.

Similar numerals refer to similar parts throughout the drawings, and the normal direction of rotation of the various moving parts is indicated by arrows.

The machine specifically disclosed in Figs. 1–4 has a base 1 forming an oil reservoir with an upwardly extending central portion 2 carrying a tubular post 3.

A drive pulley 4 has a suitable clutch 5 mounted on a shaft 6 Fig. 1. One end of the clutch encloses a brake drum 7 fastened to the base. At

the inner end of the drive shaft is a beveled pinion 8 meshing with a bevel gear 9 fastened to or a part of the outer carrier 11 which has a flat outer surface attached by arms 12 to a central hub which may be keyed to or form a part of an upwardly extending tubular portion 13.

This whole outer carrier preferably rests on a ball thrust bearing 19 and the flat outer surface provides a support for the outer yarn supplies 29 and their tension and let-off mechanisms.

The upwardly extending tubular portion 13 rotating as a unit with the outer carrier 11 carries an enlarged hub on its upper end in which is a suitable annular bearing, such as a wood bushing 17, and extending outward therefrom are arms 16 which are cast as oblique angled blades, as shown in Fig. 2.

These arms 16 Figs. 1—2—5, which act as a fan, are preferably a part of an annular ring 40 to which may be fastened, as by the screws 20 Fig. 5 a spiral gear 15 and an inner carrier raceway 18 Figs. 1—4—5.

Meshing with the bevel driving pinion 8, on its under side, is a second bevel gear 10 Fig. 1 which is attached to or a part of the upwardly extending tubular hub 14 and which preferably rests on a ball thrust bearing 21.

The upper end of the tubular hub 14 is enlarged for a suitable annular bearing, such as the wood bushing 22, and has preferably keyed thereto a suitable driving plate or bracket casting 23 Figs. 1—4—5, having on its outer periphery suitable bearings 24 provided with suitable oiling means such as the pockets 33 Figs. 4—5, each bearing carrying a shaft 25 Fig. 5. This shaft is a part of or attached to the interrupted discs 26. These discs, whose action is fully described in my Patent #1,888,477, issued Nov. 22, 1932, are shown in Fig. 5 as meshing with the spiral gear 15, and make and break contact with suitable slots 27 in each inner yarn package carrier 28 at the same time causing the inner carriers to rotate with the bevel gear 10 in a direction opposite that of the outer supply carrier 11 Figs. 1—4.

This inner carrier 28 is mounted to slide on the inner carrier raceway 18, and this raceway, which rotates as a unit with the outer supply carrier 11, is disclosed as having an annular upward and inwardly extending tapered rim and having an annular trough shape portion extending inward under the disc drives.

This construction permits of easy assembly and guards the outer supply packages 29 from dirt and oil while at the same time providing a support for the inner or upper ends of the outer supply packages, a support for suitable rods or bars 30 which carry the yarn guides 31—32—33 Fig. 1, and a support for a preferably forked yarn guide 36 adapted to hold the yarn 37 in line while it passes both inside and outside the inner carriers, and also to prevent the yarn 37 from becoming soiled by contact with an edge of the slot 39 Figs. 4—5 provided for it in the outer rim of the raceway 18.

Between the flat outer surface of the outer supply carrier 11 Fig. 1 and the annular ring 40 which rotated therewith is a thin sheet metal casing 41 preferably fastened to the flat surface of the outer carrier through the bars 42 which may also support the inner end of the hinged guide lever 43. This metal casing 41 protects the base oil reservoir and gears from dirt.

The inner carriers 28 are held in sliding contact with the inner carrier raceway rim both by gravity, by centrifugal action, by friction of the revolving discs, and by the plates 44 Figs. 1—4 fastened thereto and provided with an inwardly extended lip to slide under the annular surface 45 Fig. 1 of the inner carrier raceway 18.

In order to control the passage of the yarn 37 either inside or outside of the inner carriers 28 these carriers have an upper outwardly extended portion 46 to which is preferably attached a plate 47 whose edges drive the yarn either side of the inner packages 48. Between this plate 47 and the main portion of the inner carrier 28 is provided a recess 49 whose outer edge is at a greater distance from the center of the machine than is the prow 50 Fig. 4 of the inner carrier plate 47.

This recess 49 provides space for a stationary cam shaped plate 51 Figs. 1—4. This cam plate is fastened to or a part of the stationary cap plate 52 which is suitably fastened to the stationary center post 3.

When the yarn 37 Fig. 4 is not contacting with the guiding edge of the cam plate 51 the outer fixed yarn guide 31 holds the yarn so that the prow 50 of the inner carrier plate 47 will pass outside the yarn, as disclosed at 53. If the cam plate 51 lifts the yarn 37 the prow 50 will pass inside the yarn, as disclosed at 54.

It will be evident that by thus providing an ample recess 49 between the plate 47 and the body of the inner carrier 28 a positive control of the yarn 37 is assured very close to the point of greatest need, namely the prow 50 of the inner carrier guide plate 47.

Preferably mounted in vertical grooves in the annular ring 40 which supports the inner carrier raceway 18 and the spiral gear 15, are yarn equalizing or compensating levers 34 Figs. 1—3—5, preferably of wire and held in place by metal plates 55 suitably bent to provide upper and lower bearings for the lever.

The inner carrier disc drive plate 23 is provided with a cam shaped groove 56 in which slides the upper end of the levers 34 while the lower arm of this lever carries a grooved yarn guide 35.

As the yarn 37 Fig. 1 from the outer yarn supply packages 29 is lengthened between the braiding point 57 and the outer yarn guide 31 by being forced either outside or inside the inner carriers, the yarn guide 35 moves slightly outward thus compensating for this change and damping the movement required of the hinged guide lever 43 which is normally pressed downward by a suitable spring, not shown.

The inner carrier guide plate 47 preferably supports the inner supply yarn package 48 and suitable guide posts 58 and 59 for the yarn 60 from this inner supply, as well as suitable let-off and stopping mechanism, not shown.

The beater disclosed herewith essentially comprises a cam plate 61 Fig. 1 rotating with the inner carriers and adapted to vibrate a rod or rods 62 whose upper end rests against an enlarged portion of a tubular beater 63 which is pressed downward against the rod 62 by a suitable spring 64, the whole being mounted in a removable head 65.

At the rear of the base 1 Fig. 4 is a tubular post 66 adapted to support a take-up wheel 67 Fig. 1 and a suitable guide 68 at or near the braiding point 57.

Obviously the essential features of this braider can be somewhat altered as to specific design

without departing from the scope of the invention.

Therefore, without limiting myself to the precise construction shown what I desire to secure by Letters Patent is the following:—

1. In a braiding machine of the circular orbit type, an outer carrier for the outer set of yarn supply packages, a raceway rotating with said outer carrier, individual inner yarn supply carriers mounted on said raceway and inclined to the braiding point, a yarn guide located beyond the inner carriers and in line with said carriers and the braiding point and rotating with the outer carrier in a fixed position, a cam, and a movable yarn guide controlled by said cam and adapted to maintain a uniform tension in the yarn between the fixed yarn guide and the braiding point at all times.

2. In a braiding machine having two sets of yarn supply packages rotating in opposite directions about a common braiding point, an outer carrier for all the outer supply packages, individual inner carriers for each inner supply package, a yarn guide having a fixed position outside said inner carriers in line with said carriers and the braiding point and rotating with the outer supply, and a second yarn guide also rotating with the outer supplies and having a cam controlled reciprocating movement adapted to change the length of yarn between said fixed yarn guide and the braiding point as it is deflected by the passage of an inner carrier.

3. In a braiding machine having two sets of yarn supply packages rotating in opposite directions about a common braiding point, an outer carrier for all the outer supplies, individual inner carriers for each inner supply package, a yarn guide located beyond the inner carriers in line with said carriers and the braiding point and rotating with the outer carrier in a fixed position, a second yarn guide also rotating with the outer supplies, and yarn compensating means located between said yarn guides adapted to change the length of yarn between said fixed yarn guide and the braiding point as its length is altered by the passage of an inner carrier.

4. In a braiding machine having two sets of yarn supply packages rotating in opposite directions about a common braiding point, an outer carrier for the outer set of yarn supplies, individual inner carriers for the inner set of supplies, a cam shaped yarn guide plate adapted to control the passage of the yarn from the outer supplies either side of the inner supplies as required to braid, outer yarn guides located beyond the inner carriers and in line with said carriers and the braiding point and rotating with the outer carriers, a cam, and a movable yarn guide controlled by said cam and adapted to change the length of yarn between said outer yarn guide and said braiding point as it is deflected by the passage of an inner carrier.

5. In a braiding machine having an inner and an outer set of yarn supply packages rotating in opposite directions about a common braiding point, means to control the passage of yarn from each outer supply package either side of the inner supplies as required to braid together with separate means to compensate for variations in the length of this yarn as it is deflected; said means essentially comprising a recess in each inner carrier and stationary cam shaped guides extending into said recesses beyond the center of the inner supply packages, together with a fixed yarn guide located outside the inner carriers in line with said carriers and the braiding point and rotating with the outer supplies, and a cam rotating with the inner supplies adapted to change the length of the yarn between said fixed yarn guide and the braiding point as it is deflected by the passage of an inner carrier.

6. A braiding machine essentially comprising a base, a lower carrier for the lower set of yarn supply packages, a raceway located above the lower supplies and rotating therewith, upper supply carriers for the upper supply packages, stationary cam shaped yarn guide plates located above said raceway and below the upper supply packages, a fixed yarn guide located outside said inner supplies, and a cam controlled reciprocating yarn guide adapted to change the length between said fixed guide and the braiding point as it is deflected by the passage of the inner carriers.

7. In a braiding machine having two sets of yarn supply packages rotating in opposite directions about a common center, individual inner carriers for each inner supply package, rotary discs adapted to make and break contact with each inner carrier, a driving plate carrying said discs, an outer supply carrier, means rotating with said outer carrier to rotate said discs on their axis, a stationary cam adapted to control the passage of yarn from the outer supplies either side of the inner supplies, a yarn guide, and a second cam adapted to control the movement of said yarn guide to maintain uniform tension in the outer supply yarn as it is deflected by passing the inner carriers.

8. In a braiding machine having two sets of yarn supply packages rotating in opposite directions about a common braiding point, individual inner carriers for each inner supply package, rotary discs adapted to make and break contact with each inner carrier, a driving plate carrying said discs, a cam rotating with said driving plate, an outer supply carrier, a fixed yarn guide rotating with the outer carrier outside the inner carriers and in line with said carriers and the braiding point, and a second yarn guide rotating with the outer carrier and having an independent reciprocating movement controlled by said cam, said reciprocating yarn guide being adapted to change the length of yarn between said fixed yarn guide and the braiding point as it is deflected by the passage of each inner carrier.

9. In a braiding machine having two sets of yarn supply packages rotating in opposite directions about a common braiding point, an outer carrier, a raceway rotating with the outer carrier, inner carriers mounted on said raceway, a yarn guide plate attached to the upper portion of each inner carrier so as to form a recess between said plate and the body of said carrier, an inner supply package mounted on each yarn guide plate between it and the braiding point, and a stationary yarn guide plate extending into said recess sufficiently beyond the center of the inner supply packages to force yarn from the outer supplies to slide across the outside edge of the inner carrier yarn guide plate.

10. In a braiding machine of the circular orbit type, an outer carrier for the outer set of yarn supply packages, a raceway rotating with said outer carrier, and individual inner yarn supply carriers mounted on said raceway and inclined to the braiding point, a yarn guide plate attached to the outer portion of each inner carrier so as to form a recess between said plate and the body of said carrier, an inner supply package mounted between each of said plates and the

braiding point, and a stationary yarn guide plate extending into said recesses below the inner carrier guide plates and having its outer edge extending sufficiently beyond the center of the inner supply packages to force yarn from the outer supplies to pass outside the inner carriers.

11. In a braiding machine, a base, a stationary post rising from the center of said base, a carrier on which are mounted the outer set of yarn supplies, an upwardly extending tubular portion enclosing the stationary post and rotating with the outer yarn supplies, a raceway for the inner supply carriers located above the outer yarn supplies and rotating therewith, an inner set of package carriers mounted to rotate on said raceway and inclined to the braiding point, a recess in each of said carriers, and stationary yarn guides for the yarn from the outer supplies extending into said recesses, said yarn guides being adapted to force yarn from the outer set of yarn supplies to pass outside the inner carriers.

12. In a braiding machine of the circular orbit type, an outer supply carrier having a flat outer surface and an upwardly extending central hub, an annular trough located above said outer carrier and rotating therewith, an inner carrier raceway extending upward and inward from the outer surface of said trough, individual inner carriers mounted on said raceway, discs adapted to make and break contact with said carriers located in said trough, and means for rotating said inner carriers and outer carrier in opposite directions.

13. In a braiding machine, an outer carrier having a flat outer surface above which are mounted the outer supply flat packages, an inner carrier raceway located above said outer supplies and connected to rotate therewith by an annular trough shaped portion, inner carriers mounted to rotate on said raceway above said trough, an inner supply package on each inner carrier, rotary drive discs located below said carriers and above said trough, and a gear above said trough adapted to rotate said discs on their axis.

EDWARD K. STANDISH.

CERTIFICATE OF CORRECTION.

Patent No. 1,955,206. April 17, 1934.

EDWARD K. STANDISH.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, line 87, claim 13, for "a flat" read an; and line 88, strike out the word "flat"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of May, A. D. 1934.

Bryan M. Battey

(Seal) Acting Commissioner of Patents.