

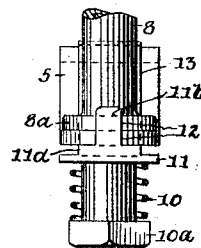
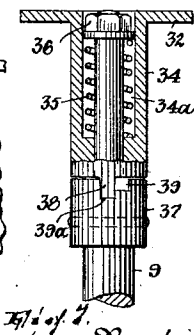
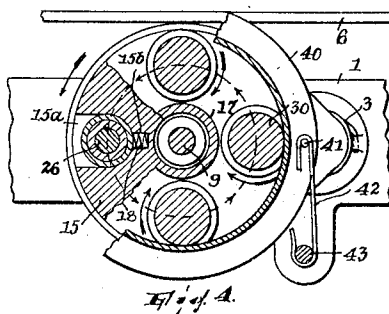
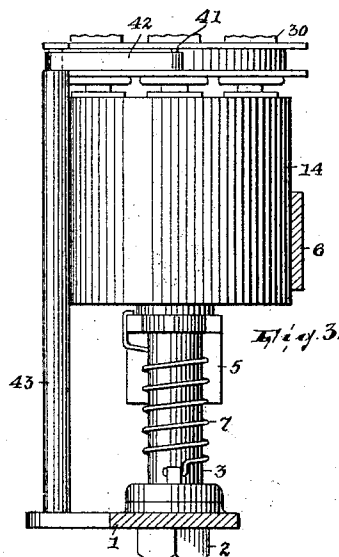
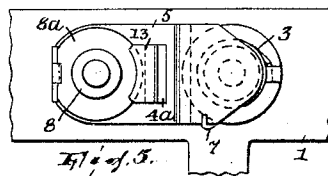
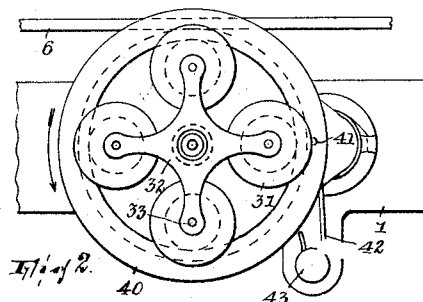
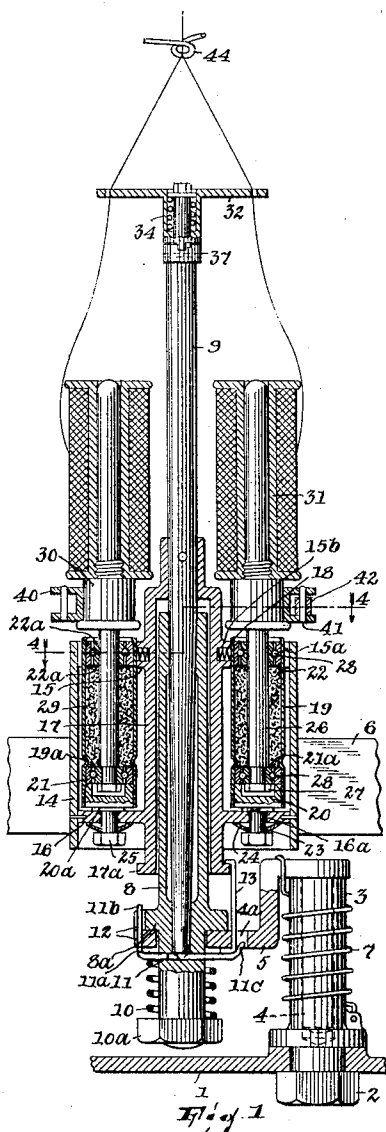
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F. KLEIN

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DOUBLING AND TWISTING MACHINE

Filed March 16, 1931



By his Attorney

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UNITED STATES PATENT OFFICE

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DOUBLING AND TWISTING MACHINE

Application filed March 16, 1931. Serial No. 523,027.

This invention relates to machines whereby certain twisting and doubling operations are performed on yarn or thread, and especially to machines of the type in which the yarn spools or other cores form with a race member for rotating them on their own axes an epicyclic train. My invention has for its general object to provide a unit for a machine of this class whereby at the will of the operator the yarns may be individually twisted and then doubled and the doubled product twisted, or the yarn simply doubled and the doubled product twisted, thus lowering the cost of equipment and reducing floor space, consumption of power and supervision; wherein the centrifugal forces generated shall be employed to insure a substantially positive drive of each rotary yarn-core-including element; and whereby, without undue wear and tear or strain of the parts, high speed shall be possible, with consequent increase in production over that obtained from machines at present in common use for performing the operations stated.

In the drawing:

Fig. 1 is a view of the improved unit mainly in vertical central section;

Fig. 2 is a plan view thereof;

Fig. 3 is a side elevation of the lower portion thereof as seen from the right in Fig. 1;

Fig. 4 is a horizontal section on line 4-4, Fig. 1;

Fig. 5 is a plan of the sun-spindle bolster, the bracket supporting it and a certain retaining member 13;

Fig. 6 is a left side fragmentary elevation of said bolster and bracket, illustrating coupling means therefor; and

Fig. 7 is a view, partly in front elevation and partly in section, of the upper part of the unit.

On the rail 1 is secured by a nut 2 a tubular post 3 affording a bearing for the depending stud 4 of a bracket 5 which may shift toward and from the driving belt 6 of the machine and is normally urged toward the same by a spring 7 coiled about the post and engaged therewith at one end and with the bracket at the other.

Said bracket receives in a hole thereof the

lower end of the bolster 8 for the sun-spindle 9, the bolster having a collar 8a resting on the bracket and held thereagainst by a spring 10 interposed between the bracket and a nut 10a screwed on said end of the bolster. The bolster is secured against rotation in the bracket by a coupling member which may be a plate 11 apertured to receive the said lower end of the bolster (being clamped between the bracket and spring 10) and having at one end an upturned flange 11a bearing against the under side of the bracket and formed with an extension or coupling tongue 11b engaged in notches 12 in the bracket and bolster-collar 8a and having at the other end an upturned lug 11c engaged in a notch 4a of the bracket so that said member is itself held from turning. Clamped between the latter end of said member and the bracket is one of the bent-off ends of a retaining member 13 whose other end is adapted to overhang a flange 17a on the hub of a carrier (to be described) to keep the latter from rising, though repressible from said flange in order to permit the carrier to be removed from the bolster.

Said carrier comprises, with the sun-spindle, a body member itself comprising a sheave-like shell 14 having upper and lower interior disks or walls 15 and 16 joining it to its hub 17, which is pinned on the spindle, said hub having the mentioned flange 17a; the shell and its walls are here shown pinned together, whereas the hub and said walls are integral, but these are of course immaterial details. The shell 14 is normally held by the spring 7 bearing, sheave-fashion, against the belt, whereby the carrier is rotated. The walls 15 and 16 respectively have radial slots 15a and holes 16a vertically aligned with each other further, at the inner end of the slots are seated in recesses 15b springs 18 whose function will appear. The carrier also comprises bolsters for the planet-spindles, each formed as follows: A sleeve 19 is received by one of the slots 15a which serves as a guideway therefor and has near its lower end an internal shoulder 19a against which is held, by a cup-shaped plug 20 screwed into the lower end of the sleeve, an outer ball-bearing race

21. In the upper end of the sleeve is held in any way, as by being forced into the sleeve, another outer ball-bearing race 22. The bolster (specifically, its plug 20) has a reduced and underneath-flat seat 20a and a stem 23 depending through hole 16a and on which is a dished spring-washer 24 held against wall 16 by a nut 25 screwed on the stem. The bolster, with its seat resting on wall 16, tends to stand vertically, though it is mounted for tilting under the influence of centrifugal force in a radial direction (guided by slot 15a) when the carrier is rotated.

In each such bolster, to wit, in the bearings 21—22, is journaled a planet spindle 26 which has secured on its lower end, by a nut 27, an inner ball-bearing race 21a and jammed thereon the inner ball-bearing race 22a, the races 21a and 22a being arranged as complements of the races 21—22, 28 being the balls between the races. Between the two sets of races may be packing 29 for lubricant. Each spindle has a driving whirl 30 flanged at its lower end and arranged above the shell 17 and on its upper end it may have affixed thereto, as by being screwed thereon, the supply spool 31. I term each spindle and core a yarn-core element.

For guiding the yarn there is a guide or spider 32 having yarn guide holes 33 in its several arms. It is formed with a central hub 34 which is bored to receive the reduced upper end of the sun-spindle and counter-bored at 34a to receive a spiral spring 35 interposed between the lower end of the counter-bore and a nut 36 screwed on said spindle, whereby the spider is normally depressed against a collar 37 on said spindle. The hub 34 has a depending lug 38 which is received in a notch 39 in the collar of such width as to limit rotation of the spider to 45 degrees, or from the position where its holes 33 vertically register with the planet-spindles to a position where they so register with the spaces between them (there being in the present case four equally spaced planet-spindles and four arms to the spider) and permit doffing of the spools from the planet-spindles. The spider may be retained in the first position by a counter-notch 39a into which, under pressure of spring 35, the lug 38 may enter.

The planet-spindles whirls are all equally spaced from the axis of the sun-spindle and of equal diameters, and they are surrounded by an annular race or ring 40 resting on their flanges and having an exterior peripheral groove which is traversed by a pin 41; the inner diameter of the ring or race is preferably such that with their axes perpendicular all the whirls contact therewith. A detent in the form of a link 42 attached to an upstanding post 43 on the rail 1 and having a hook to engage pin 41 is employed to hold the ring from rotation when the unit is operating in spinning, doubling and twisting;

when this detent is unhooked from the pin the ring is free to rotate around the sun-spindle, as when doubling and twisting. The construction is such that the link not only affords a pivotal connection between the race and post when they are coupled thereby but the link and post have some elasticity, whereby the race yields to the vibrations of the unit both diametrically and rotatively of the carrier.

44 is a guide through which the spun or individually twisted, doubled and twisted, or merely doubled and twisted, yarn passes up to some receiving spool or the like.

Operation.—When the carrier is being driven by the belt 6 the pressure of the springs 18 plus centrifugal force acting on what I term the yarn supplies comprising the mentioned yarn-core elements and their bolsters tends to tilt said supplies outwardly in the body of the carrier, holding the spindles whirls against the annular race 40, whereby the planet spindles will be rotated reversely to the carrier if the race 40 is held from rotation by the detent 42; or, if the race is released by disconnecting the detent therefrom, since the race is now free to rotate around the axis of the carrier, the planet spindles will stand non-rotating. In the one case the yarns will be first each individually twisted and then doubled and twisted together, and in the other simply doubled and twisted. The springs 18 are present mainly to insure driving contact of the whirls with the race when spinning, doubling and twisting at a speed too low to insure such contact being effective as the result merely of centrifugal force; they are usually not indispensable. When doffing, the attendant lifts the yarn guide or spider and turns it 45 degrees, thus bringing its arms out of registry with the spools and affording them the necessary clearance for their removal and replacing with filled spools.

Certain important novel features of my invention will be clear upon comparison of my mechanism with those of the Saracco Patents Nos. 1,096,059 and 1,131,981 in the latter of which is an epicyclic train whose yarn spools or cores are shiftable to different angular relations to the main axis of the train but are suspended for this purpose, and in the former of which they are each tiltable on a support from which they upstand but on a hinge. Thus: The race or driver of the epicyclic train is actually carried by the aforesaid supplies, specifically, in the example, by their yarn-core elements; when the unit is operating for individual twisting, doubling and compound twisting such driver is consequently free to shift in any direction relatively to the axis and as an incident of the lateral vibrations of the unit due to its described connections 42—43 with the supporting structure 1. Said driver is disconnectively connected with its anchorage (as 43) so as either to be held from or permitted to rotate with said ele-

ments around the main axis of the unit. The parts 23—16a form a longitudinal telescopic connection opposing sliding movement of the bolster in a plane coincident with the axis of the carrier but permitting rocking movement thereof in said plane and also universally so that good driving contact between the yarn-core element and race or driver 40 will result. Each tiltable member is supported by an underneath support (wall 16) so as to stand when the unit is at rest in a state of stable equilibrium, because a vertical line passing through the center of gravity (here in the axis of the spindle) passes through the base of its seat 20a. The carrier body, by comprising a cylindrical shell and two disks (15 and 16) traversing its bore and the upper one of which guides the aforesaid tiltable members radially and the lower one of which forms a telescopic joint with each such member, is well adapted to withstand the forces, mainly centrifugal, active thereon. Given a carrier having bolsters for said elements, such carrier has means, afforded by its shell, to house the bolsters and consequently the lubricant contained therein.

In certain aspects of my invention it is only material, as between the driver 40 and the carrier and in order that the yarn-core elements be rotated in the carrier, that one of them rotates with reference to the other.

I claim:

1. In combination, with supporting structure, a rotary carrier revoluble therein, yarn-core elements freely revoluble in the carrier and arranged in planetary relation thereto, and a non-rotating driver having a contact surface extending around the axis of the carrier and with which said elements peripherally contact and free to shift relatively to the carrier axis transversely thereof.

2. In combination, with supporting structure, a rotary carrier revoluble therein, yarn-core elements freely revoluble in the carrier and arranged in planetary relation thereto, a driver having a contact surface extending around the axis of the carrier and with which said elements peripherally contact and free to shift relatively to the carrier axis, said structure having an anchorage, and means to disconnectively couple the driver to said anchorage.

3. In combination, with supporting structure, a rotary carrier revoluble therein, yarn-core elements freely revoluble in the carrier and arranged in planetary relation thereto, a driver having a contact surface extending around the axis of the carrier and with which said elements peripherally contact, and elastic means connecting the driver with said structure and opposing rotation of the driver with said elements.

4. In combination, with supporting structure, a rotary carrier revoluble therein, yarn-core elements freely revoluble in the carrier

and arranged in planetary relation thereto, a freely rotative driver having a contact surface extending around the axis of the carrier and with which said elements peripherally contact, and means, connecting the driver with said structure and pivoted to one and detachably connected to the other of them, to oppose at will rotation of the driver with said elements.

5. In combination, with supporting structure, a rotary carrier revoluble therein, yarn-core elements freely revoluble in the carrier and arranged in planetary relation thereto, a driver having a contact surface extending around the axis of the carrier and with which said elements peripherally contact and a link connecting the driver with said structure and pivoted to one of them and opposing rotation of the driver with said elements.

6. In combination, with supporting structure, a carrier body member arranged therein, yarn supplies arranged in said member around a common upright axis and respectively including yarn-core elements revoluble on upright axes, and a driver member carried by said supplies and having a contact surface extending around said axis and with which said elements peripherally contact, one of said members being revoluble around said axis relatively to the other.

7. In combination, with supporting structure, a carrier body member arranged therein, yarn supplies arranged in said member around a common upright axis and respectively including yarn-core elements revoluble on upright axes, and a driver member carried by and extending around said supplies and having said elements peripherally in contact with its inner periphery, one of said members being revoluble around said axis relatively to the other.

8. In combination, with supporting structure, a carrier body revoluble therein on an upright axis, yarn supplies arranged in said body around said axis and respectively including yarn-core elements revoluble on upright axes, and a driver carried by said supplies and having a contact surface extending around said axis and with which said elements peripherally contact.

9. In combination, with supporting structure, a carrier body revoluble therein on an upright axis, yarn supplies arranged in said body around said axis and respectively including yarn-core elements revoluble on upright axes, and a driver carried by and extending around said supplies and having said elements peripherally in contact with its inner periphery.

10. In combination, with supporting structure, a carrier body revoluble therein on an upright axis, yarn supplies arranged in said body around said axis and respectively including yarn-core elements revoluble on upright axes, a driver carried by said sup-

plies and having a contact surface extending around said axis and with which said elements peripherally contact, said structure having an anchorage, and means to disconnectively couple the driver to said anchorage.

11. In combination, with supporting structure, a carrier body revoluble therein around an upright axis, a yarn supply arranged in the body in offset relation to said axis and including a revoluble yarn-core element having its axis upright, and a driver having a contact surface extending around the first axis and with which said element is normally held in peripheral contact, said supply having an underneath seat on said body on which it is free to rock universally and having its center of gravity in a vertical line passing through said seat.

12. In combination, with supporting structure, a carrier body revoluble therein around an upright axis and comprising a shell formed substantially cylindrical around said axis and a wall traversing the shell, a yarn supply including a revoluble yarn-core element having its axis upright, said supply being rockable in an upright plane on said wall and said wall confining the supply from sliding in said plane, and a driver having a contact surface extending around the first axis and with which said element is normally held in peripheral contact.

13. In combination, with supporting structure, a carrier body revoluble therein around an upright axis and comprising a shell formed substantially cylindrical around said axis and upper and lower spaced walls traversing the shell, a yarn supply including a revoluble yarn-core element having its axis upright, said supply being rockable in an upright plane on one wall and such wall confining the supply from sliding in an upright plane and said supply being guided in such rocking by the other wall, and a driver having a contact surface extending around the first axis and with which said element is normally held in peripheral contact.

14. In combination, a support, a bolster seated on and having a depending portion penetrating the support, means, including a spring and arranged on said portion, to hold the bolster pressing against its seat on the support, a rotary yarn-supply means journaled in and upwardly removable from the bolster and having a peripheral projection, and detent means yieldingly held clamped by the first means in position to overlies said projection and obstruct removal of the bolster.

15. In combination, a support, a bolster seated on and having a depending portion penetrating the support, a rotary yarn-supply means journaled in the bolster, and means, including a spring and arranged on said portion, to hold the bolster pressing against its seat on the support, said means

positively locking the bolster against rotation on the support.

16. In combination, a bolster, a carrier journaled therein with its axis upright and including an axial spindle, a yarn-core arranged on the carrier eccentrically thereof, and a yarn-guide on the spindle having an eccentric yarn-guiding arm and rotatable on the spindle to bring said arm into or out of overhanging relation to said yarn-core, said spindle and yarn-guide having means to releasably hold the yarn-guide in overhanging relation to said yarn-core.

17. In combination, with supporting structure, a rotary carrier revoluble therein, yarn-core elements freely revoluble in the carrier and arranged in planetary relation thereto, and a non-rotating driver having a contact surface extending around the axis of the carrier and with which said elements peripherally contact and free to vibrate around said axis.

18. In combination, with fixed structure, a driving means, a rotary carrier to be driven by said means, a support in which the carrier is journaled movable in said structure to move the carrier toward or from said means, yarn-core elements freely revoluble in the carrier and arranged in planetary relation thereto, a driver having a contact surface extending around the carrier axis and free to shift with said support and carrier toward or from said axis.

In testimony whereof I affix my signature.

FREDERICK KLEIN.

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