

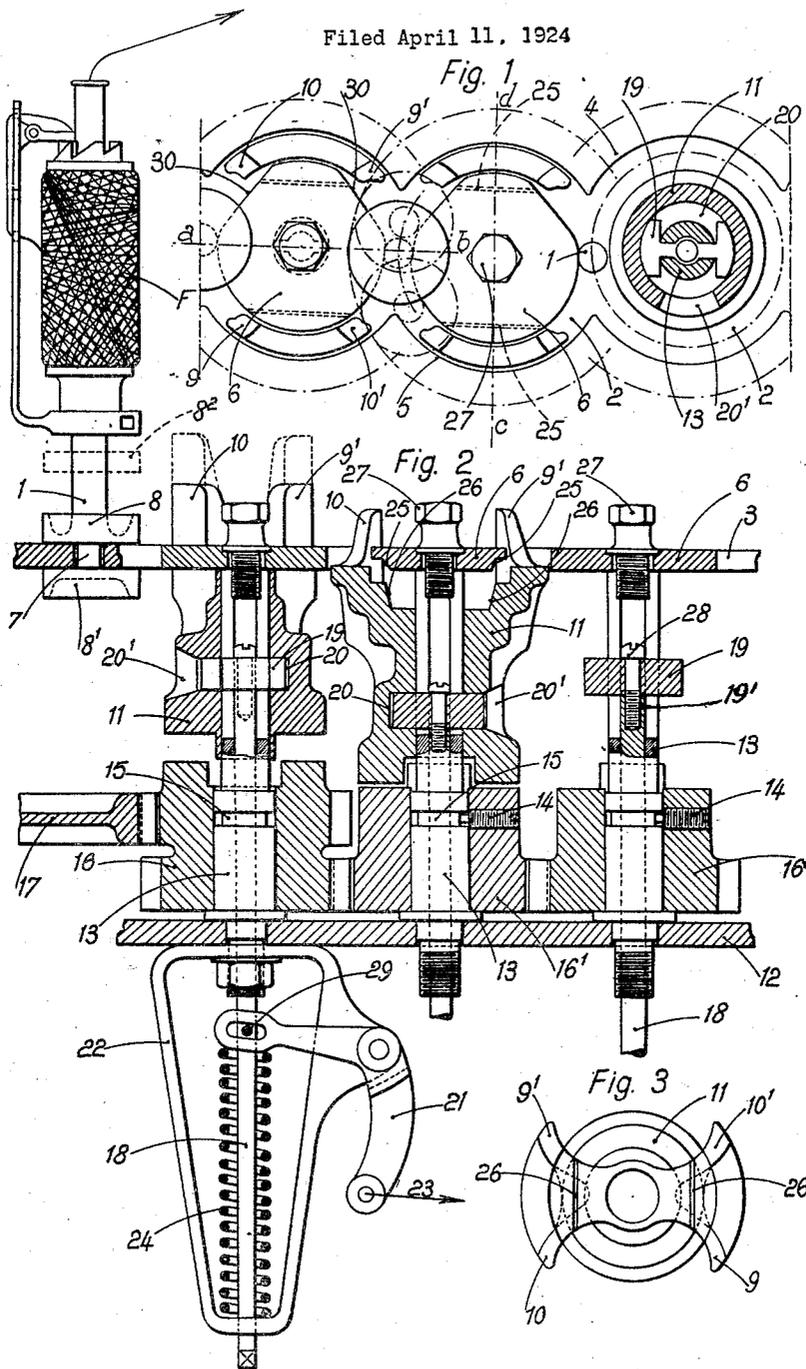
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BRAIDING MACHINE

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BRAIDING MACHINE.

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To all whom it may concern:

Be it known that we, LOUIS JOSEPH GUSTAVE LEFLAIVE, citizen of the French Republic, and JEAN JACQUES KNECHT, citizen of Switzerland, both engineers, residing at La Chaleassiere, St.-Etienne, Department of the Loire, in France, have invented certain new and useful Improvements in or Relating to Braiding Machines, of which the following is a specification.

The present invention relates to improvements in lace-making machines and more particularly to the mechanism by means of which the bobbins of such machines are driven and held, the purpose of the invention being essentially to secure simpler and more economical working of the said mechanism.

In apparatus according to the invention, the bobbins are driven in a suitable raceway in such manner that the thread is not subjected to any action tending either to twist it or to untwist it, furthermore the driving members for the bobbins act thereon in such way as to push them continually towards the theoretical centre of their displacement. Owing to this last arrangement shocks of the bobbins against the crossing places of the raceways are avoided, thus lessening friction and excessive wear. Owing to their comparatively great height, the bobbins have a tendency to wedge. This drawback is obviated by means of our arrangement which acting above as well as below the raceway displaces the bobbins while keeping their axes always unaltered.

In the accompanying drawing, Figure 1 is a plan view of three bobbin drives, in one of which a part of the mechanism is shown in section. Figure 2 is a view partly in elevation and partly in section of the three drives; the bobbin shown in elevation has been slightly moved out of centre with respect to the plan view in order to simplify the drawing, the first left-hand section of the mechanism passes through the longitudinal axis *a-b* whilst the section of the second drive passes through an axis *c-d* perpendicular to the longitudinal axis, in the third section a part of the mechanism is removed, the same references to the same members are used in all sections.

Figure 3 shows in plan the clawed driver in accordance with the invention.

Referring to the figures, the cop F is

mounted on its foot, and together with the latter constitutes the bobbin. This is controlled by a jacquard through a particular member 11, called "driver". The bobbins F move in a circular raceway 2 cut out of the upper plate 3 (Figure 2). The bobbins rest either on the inner part 4 or the outer part 5 of the plate 3, as well as upon discs 6 fixed flush with the surface of the plate 3. The space left between the parts cut out of the plates 3 and the discs 6 constitutes properly speaking the raceway 2 in which the bobbins move.

As shown in Figure 2, the bobbin is provided at its base with two collars 8-8' connected together by the member 7. This aggregate constitutes a support and a guide for the bobbin called "bobbin-foot". These collars which serve also for driving the bobbin may be as wide as is desired. For the purpose of obtaining better guiding, their number may be increased, as will be seen later on.

In the example chosen, in which only three mechanisms are shown, they are driven by a toothed pinion 17 which transmits its motion to the first mechanism, this in turn transmitting it to the second and so on.

On the lower plate 12 are located vertical spindles 13 on which the aggregate mechanism for driving the bobbins is mounted. Only one of these mechanisms is shown completely at the left hand of Figure 2. The vertical spindles 13 are bored throughout their whole length, in order to allow of the passage of a rod 18 which is prolonged downwards to the lower part of a member 22, the object of which will be described subsequently. The lower part of each of the spindles 13 is screw-threaded, as shown in the drawing, which allows of their being rigidly attached, together with the member 22, to the lower plate 12.

On the lower part of these spindles are mounted toothed members 16 which can rotate freely, but are unable to shift axially owing to the groove 15 which is engaged by the screw 14. Members 11 called "drivers" are on the upper portion of the spindles above the members 16 and these drivers can shift vertically on the spindles 13 owing to their connection with a double T-shaped member 19 (Figure 1) attached by a screw 23 to top of the rod 18. The core of this member slides in a longitudinal groove 19' 110

provided in the spindle 13, the member 19 being introduced into the driver through the aperture 20'. The discs 6 are attached to the upper part of the spindles 13 by means of bolts 27, which clamp them thereto.

The members 11, called drivers, which are one of the essential characteristics of the invention, can thus rotate freely about the spindles 13 and shift longitudinally upon them. Their shape is clearly indicated in plan (Figure 3) and in the two sections (Figure 2) they terminate in two symmetrical members in the shape of a circular arc, the ends of which form a kind of vertical claw 9, 9' and 10, 10' of a certain height and prolonged below the plate 3. It is these claws which in their rotation engage with the collars 8, 8' of each bobbin and drive them, always pushing them towards the theoretical centres of rotation of the drivers. The height of the claws may be increased if so desired, to secure a still greater support to the bobbin, as indicated in dotted lines in Figure 2. These heights moreover will always be in proportion to the height of the bobbin and the tension of the thread. In these circumstances a third collar 8² shown dotted may be added to the foot 1; it is by this means that normal working is secured eliminating the chances of blocking, wedging and excessive wear. Furthermore this pushing towards the centre of rotation on account of the action of the claws, does away with the effects due to centrifugal force, which tend unceasingly on the other hand to impel the bobbin outwards and to make it deviate from its normal course; owing to this, the driver not only drives it, but also guides it correctly. It will be further observed that the driving occurs at the point furthest from the centre contrary to all known arrangements.

The control of the driver by the jacquard (not shown) is effected as follows: The member 22 which has been mentioned above, comprises a spring 24 threaded over the rod 18 at the upper part of which is fixed as already stated the member 19 enclosed in the driver, this spring bears on the stirrup at its lower part and on one of the arms of a lever 21 at its upper part. This arm is provided at its end with an eye 29 traversed by a pin integral with the rod 18. The other arm of the lever 21 is connected at its end 23 to a controlling rod from the jacquard.

The jacquard draws the lever 21, the latter, whilst compressing the spring 24, pulls down the rod 18, which, drawing the driver 11 downwards, places it in gear, owing to a clutch 25' provided to connect the driver with the toothed pinion 16. The driver will then be driven according to the direction of rotation of the pinion 17 either to the right or left; the claws 9, 10

and 9', 10' will then drive the bobbins, which as a matter of fact characterizes the essential work of the machine.

If the jacquard ceases to operate, the spring 24 comes into play pushing upwards the rod 18 and consequently the driver 11, this latter being declutched is no longer driven by the toothed pinion 15. To secure the stoppage of the driver 11 and to hold it in its position a second toothed coupling is provided which allows of clutching it to the disc 6. With this object in view, the disc 6 comprises two symmetrical milled parts parallel to the longitudinal axis while two corresponding inclines 26, Figure 2, are provided on the driver, the inclines by engaging with the milled parts 25 keep the parts 25 exactly in the desired position. In order that the external surface of the raceway should not be modified, the milled parts 25 extend to only about half the thickness of the disc 6.

As has been explained above, the claws of the driver are so shaped that they always push the bobbins towards the centre of rotation of the claws. Owing to this peculiarity and to maintain the symmetry of the claws, whether the number of bobbins is large or very small, straight parts 30 are provided on the periphery of the disc 6 (Figure 1) towards which the bobbins are pushed during their shifting. Owing to these straight parts, the members 7 of the bobbin-foot cannot strike against the cross-overs of the raceways, thus avoiding shocks, jamming, and excessive wear. When it is considered suitable, these flat parts may be provided at other positions than those shown in the drawing.

In this new apparatus for driving the bobbins, which is the subject of the invention, there is so to speak only a single member in motion, which can be exposed to wear and that is the clawed driver 11. It occupies two main positions, one above where it is clutched by the fixed discs in order to bring to rest the corresponding bobbins, and the other below where it is clutched with the toothed driving pinion which communicates its motion to it, and without any intermediate member, and indifferently with respect to the direction of rotation to left or right.

The parts of the apparatus are constructed and arranged so that they may be readily assembled and disassembled. In fact, it is sufficient to unscrew the bolt 27 and remove the pin 29 to permit of the ready removal of the driver and the remaining parts of the apparatus.

Having thus fully described the invention what is claimed as new and desired to be secured by Letters Patent is:—

1. A lace making machine including in combination, upper and lower annular plates

the upper of which is provided with a circular raceway, a circular series of discs arranged in the raceway so as to divide the raceway into two oppositely extending and intersecting waving slots, bobbins mounted to slide in said slots, vertically movable and rotatable drivers arranged between the plates, vertical claws formed on the drivers and operating in the slots for coacting with the bobbins, cooperative engaging means between the drivers and discs, means mounted beneath the drivers and engageable therewith for effecting rotation thereof, and means for moving the drivers into engagement with the discs when it is desired to stop the movement of the bobbins, substantially as and for the purposes set forth.

2. A lace making machine including in combination, superposed annular plates the upper of which is provided with a central raceway, a circular series of discs positioned in the raceway so as to divide the raceway into two oppositely extending and intersecting waving slots, bobbins mounted to slide in said slots, drivers for the bobbins mounted for rotatable and vertical slidable movement between the plates, opposed vertical claws extending upwardly from the drivers and arranged through the opposed portions of the slots for engaging the bobbins, clutch faces formed on the upper and lower edges of the drivers, clutch faces on the lower portions of the discs, rotatable pinions mounted beneath the drivers provided with clutch faces for effecting a rotation of the drivers, and means for moving the drivers upwardly into engagement with the discs when it is desired to stop the movement of the bobbins.

3. A lace making machine as claimed in claim 2, wherein hollow stationary spindles are mounted in circular series between the plates and rigidly fitted to the lower plate, means for securing the discs to the upper ends of the spindles and drivers, and the pinions being mounted on the spindles, substantially as and for the purposes set forth.

4. A lace making machine as claimed in claim 2, wherein the means for effecting vertical movement of the drivers includes hollow spindles mounted between the plates, vertically movable rods arranged within the spindles, and rocking members inserted within the drivers and fastened to the upper ends of the rods.

5. A lace making machine including in combination, superposed annular plates the

upper of which is provided with a circular raceway, a circular series of discs in the raceway for dividing the same into oppositely extending and intersecting slots, a plurality of bobbins the shanks of which are mounted in the slots, collars fastened to the shanks and disposed against the upper and lower surfaces of the lower plate, drivers mounted for vertical and rotatable movement between the plates, claws rising from the drivers and operating in the slots and shaped so as to be always engaged with the collars of the bobbins, substantially as and for the purposes set forth.

6. A lace making machine including in combination upper and lower plates the upper of which is provided with a raceway, a circular series of discs arranged in the raceway to divide the same into two oppositely extending and intersecting waving slots, bobbins mounted to slide in said slots so as to travel around the plates, mechanism for effecting movement of the bobbins including a circular series of hollow spindles fastened to the lower plate and supporting the discs, intermeshing pinions mounted on the lower portion of the spindles and provided with clutch faces, drivers mounted for rotatable and slidable movement in the spindles provided with upper and lower clutch faces for coacting respectively with the pinions and the discs, opposed vertical claws projecting upwardly from the drivers and adapted to be arranged through opposite portions of the slots and in engagement with the bobbins and coacting with the discs in driving the bobbins through the raceway, spring tensioned vertically movable rods arranged through the spindles, locking members for securing the drivers to the rods so as to ensure vertical movement of the drivers with the rods, means for lowering the rods against the tension of the springs so as to lower the drivers in order that they may be actuated by the pinions, substantially as and for the purposes set forth.

7. A lace making machine as claimed in claim 6, wherein stirrups are arranged about the lower portions of the rod to facilitate the tension of the controlling springs therefor, and jacquard operated bell crank levers operatively connected with the rod, substantially as and for the purposes set forth.

In testimony whereof we hereunto affix our signatures.

LOUIS JOSEPH GUSTAVE LEFLAIVE. [L. S.]
JEAN JACQUES KNECHT. [L. S.]