

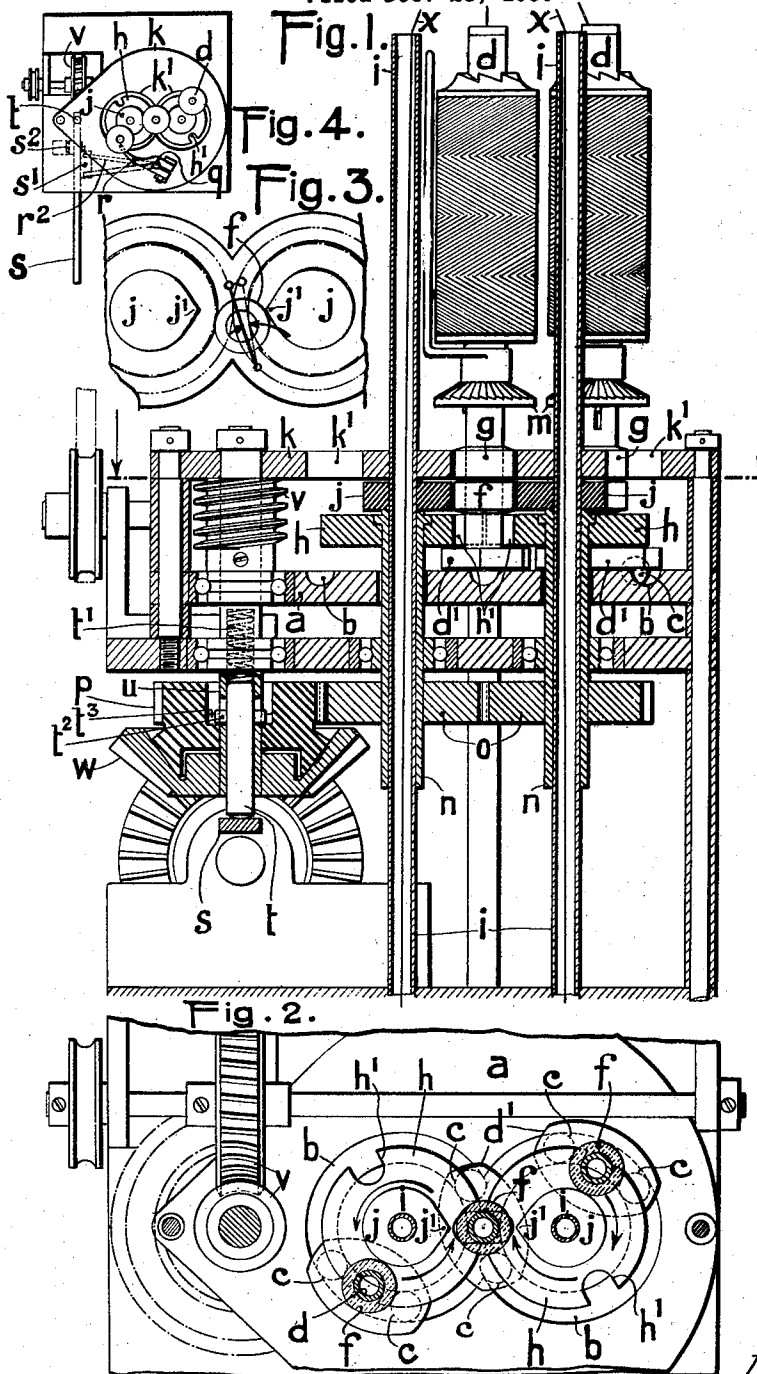
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BRAIDING MACHINE

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## UNITED STATES PATENT OFFICE

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## BRAIDING MACHINE

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Hitherto braiding machines have only operated at a relatively low speed, the bobbin spindles being moved in a groove in a guide plate by means of rotating plates in the braiding heads. The most varied arrangements have been proposed to cause the bobbin spindles in the guide groove to pass from one braiding head to the next. Controlled switches, deviating tongues, guide members or controlled couplings are favoured means for this purpose, but they are not always reliable, particularly if it is desired to run the machine at high speed.

The present invention is designed to achieve the same purpose with simpler means which are at the same time even more reliable the higher the speed. According to the invention with the bobbin spindles driven by a rotating plate, a foot bridge mounted on the bobbin spindle and supported on opposite sides of the bobbin spindle respectively by a pair of balls running in a guide-way consisting of circular sections, is so swung lever fashion about the point of support formed by the rearmost ball for the passage of the bobbin spindle from one braiding head to the next, at the beginning of operations by a control member but during normal running chiefly by the centrifugal force of the bobbin spindle, that the forward leading ball is forced out of the one circular section of the guide-way and into the next circular section thereof.

Controlled switches, deviating tongues or other delicate devices are here entirely omitted, the foot bridges of the spindles themselves each acting as a controlled swinging lever which without special directional guiding turns itself first to one side then to the other so that if care is taken to make the bobbin spindles themselves as light as possible the machine can run much faster than hitherto.

An example of the invention with two braiding heads is illustrated in the accompanying drawings, but the number of heads can be varied. Figure 1 is a vertical section and Figure 2 a horizontal section of the lower part of the machine. Figure 3 is a detail showing the control of the bridge and

Figure 4 is a diagrammatic plan on a smaller scale.

In the drawings *a* indicates the guide plate. A guide groove *b* of semicircular cross section is formed therein for the bobbin spindles, the groove forming a closed path and consisting in each braiding head of a circular section reaching to the point of transfer from one braiding head to the other. A foot bridge *d*<sup>1</sup> provided on each bobbin spindle *d* runs by the aid of balls *c* on opposite sides of the spindle in engagement with the guide groove *b*, being driven by rotating plates or discs *h* which are rotatably borne on the hollow central pillars *i* of the braiding heads and provided in their peripheries with recesses *h*<sup>1</sup> for engaging the shanks of the bobbin spindles. Above the foot bridge *d*<sup>1</sup> a follower roller *f* is loose on each bobbin spindle shank. This roller coacts with control discs *j* secured one on each braiding head pillar *i*. The form of the discs *j* can be seen in Figures 2 and 3.

When the balls *c* of the foot bridges *d*<sup>1</sup> of one of the bobbin spindles run in the guide groove *b* within a braiding head, the bobbin spindle circles around the pillar *i* thereof and around the braid warp thread *x* guided there-through, until the control roller *f* of the bobbin spindle reaches the projecting cam part *j*<sup>1</sup> of the control disc *j*. From this instant the foot bridge *d*<sup>1</sup> which is supported by the rear ball *c* is swung lever fashion by the control disc *j* in such a manner, as can be seen in Figure 3, that its leading end is forced outwards to bring the front guiding ball *c* into a position in which it can pass without shock into the section of the guide groove *b* in the guide plate *a* belonging to the adjacent braiding head. During the starting up of the machine the control disc *j* is absolutely essential. During fast running its function becomes of less importance since the control is mainly effected automatically by the centrifugal force of the bobbin spindles.

The plates *h* which serve for operating the bobbin spindles are mounted on sleeves *n* which are loosely mounted on the braiding head pillars *i* and, passing through the guide plate *a*, are provided at their lower ends

with toothed wheels  $o$  which derive their motion from a toothed wheel  $p$ . The latter forms with a gear  $w$  a clutch which is controlled by the bobbin threads.

5 The bobbin thread is under the action of a thread loading guard  $m$  which falls down the bobbin spindle shank if the thread breaks. In order to overcome a tendency of the guard  $m$  to creep upwards owing to  
10 the high speed of rotation, the guard is made roof-shaped at the top and provided with ribs shaped to catch the air so as to hold the guard as low as possible by the air braking effect. If the guard  $m$  has fallen owing  
15 to a breakage of the thread, during the course of movement of the bobbin spindle it comes into contact with a disengaging finger  $r$  on a vertical rod  $q$  (Figure 4) and swings the latter with a second finger  $r^2$  thereon out-  
20 wards which results in the finger  $r^2$  running on to an inclined surface  $s^1$  of a lever  $s$  pivoted at  $s^2$ , pressing this surface down and raising the other end of the lever in order to raise a coupling rod  $t$  (Figure 1) which  
25 couples the wheel  $p$  with the wheel  $w$  against the action of a spring  $t^1$  and thus disengage the cross pins  $t^2$  of the rod which pass through the hub  $u$  of the driving wheel  $w$ , from the claws  $t^3$  of the wheel  $p$ , thereby uncoupling  
30 the wheel  $w$  from the wheel  $p$ .

As appears from Figure 1 the bobbin spindles with their shanks are guided by a guide roller  $g$  thereon in a slot  $k^1$  in an upper guide plate  $k$ , of which the outer part corresponds  
35 in form and radius of curvature to the outer edge of the guide groove  $b$  in the guide plate  $a$ , and of which the inner part is formed by plates corresponding in shape to the discs  $j$ . In this way the bobbin spindles are properly  
40 guided so that they do not vibrate notwithstanding the high speed of the machine.

The braid is drawn off, in known manner by a reel (not shown), which is driven from the driving wheel  $w$  through a worm gear  $v$ .

45 The lever  $s$  is extended to form a convenient handle which enables the drive to be interrupted by hand.

What we claim is:

1. A high speed braiding machine, comprising a stationary guide plate with a groove comprising circular sections, braiding heads on said plate for the braid warp threads, travelling bobbin spindles guided in said  
50 guide plate groove, rotating discs in the braiding heads for driving said bobbin spindles, a control foot bridge on each bobbin spindle, a pair of carrying balls arranged to run in said guide groove and to support  
55 said foot on opposite sides of the spindle, and controlling means so arranged as to so swing said control foot lever fashion about the point of support formed by the rearmost ball, alone at the beginning of operations and with the aid of the centrifugal force of the spindle  
60 during normal running, that the front lead-

ing ball is forced out of the one circular section of the guide-way into the next circular section thereof for the passage of the bobbin spindle from one braiding head to the next.

2. A high speed braiding machine, comprising a stationary guide plate with a groove comprising circular sections, braiding heads on said plate for the braid warp threads, travelling bobbin spindles guided in said guide plate groove, rotating discs in the braiding heads for driving the bobbin  
70 spindles, a control foot bridge on each bobbin spindle, a pair of carrying balls arranged to run in said guide groove and to support said foot bridge on opposite sides of the spindle, a follower roller on each bobbin  
75 spindle and controlling cam discs arranged to so cooperate with the rollers of the bobbin spindles as to swing their control foot lever fashion about the point of support formed by the rearmost ball, alone at the beginning  
80 of operations and with the aid of the centrifugal force of the spindle during normal running, that the front leading ball is forced out of the one circular section of the guide-way into the next circular section thereof  
85 for the passage of the bobbin spindle from one braiding head to the next.

In witness whereof we have hereunto signed our names this 15th day of December  
90 1930.

ADOLF ZEHNDER.  
JEAN KAPPELER.

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