O. STEINMANN & X. PFRUNDER.

BRAIDING MACHINE.

APPLICATION FILED JULY 9, 1909.

960,122.

Patented May 31, 1910.

2 SHEETS—SHEET 1.

Fig. 1

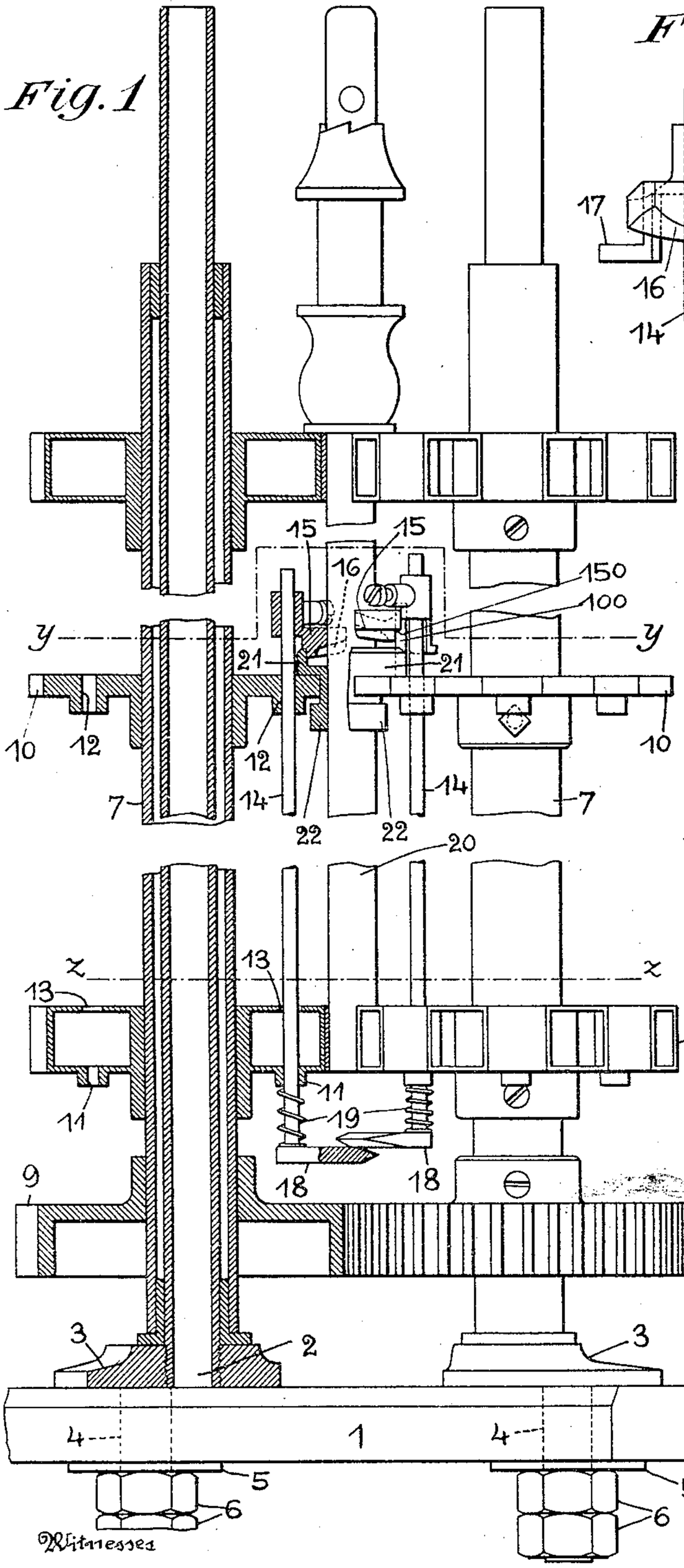


Fig. 4

Fig. 5

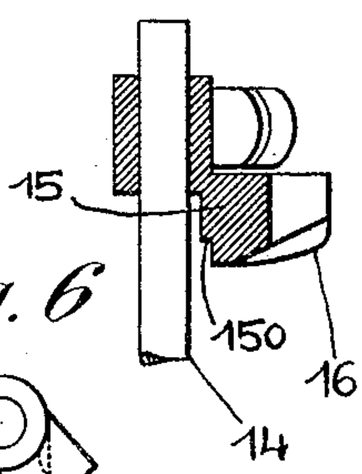


Fig. 6

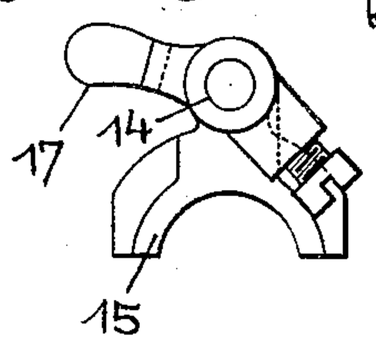


Fig. 7

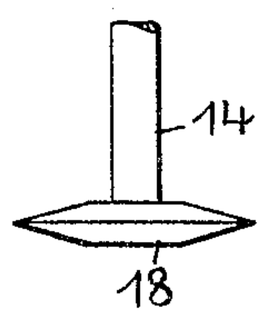


Fig. 8

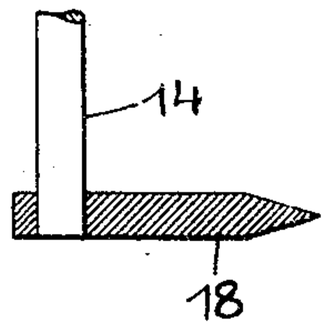


Fig. 9

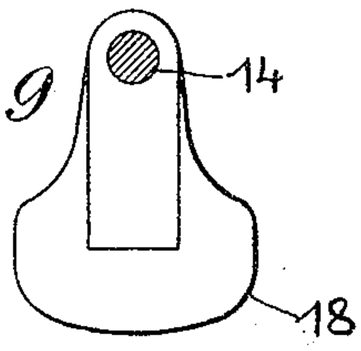
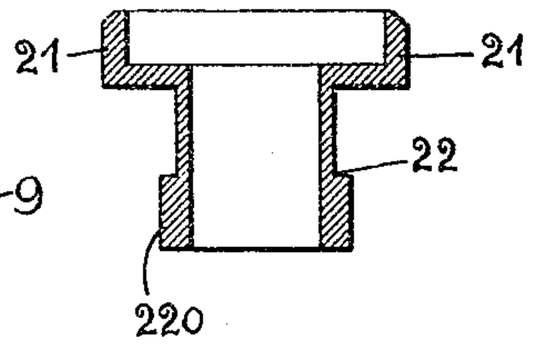


Fig. 10



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3

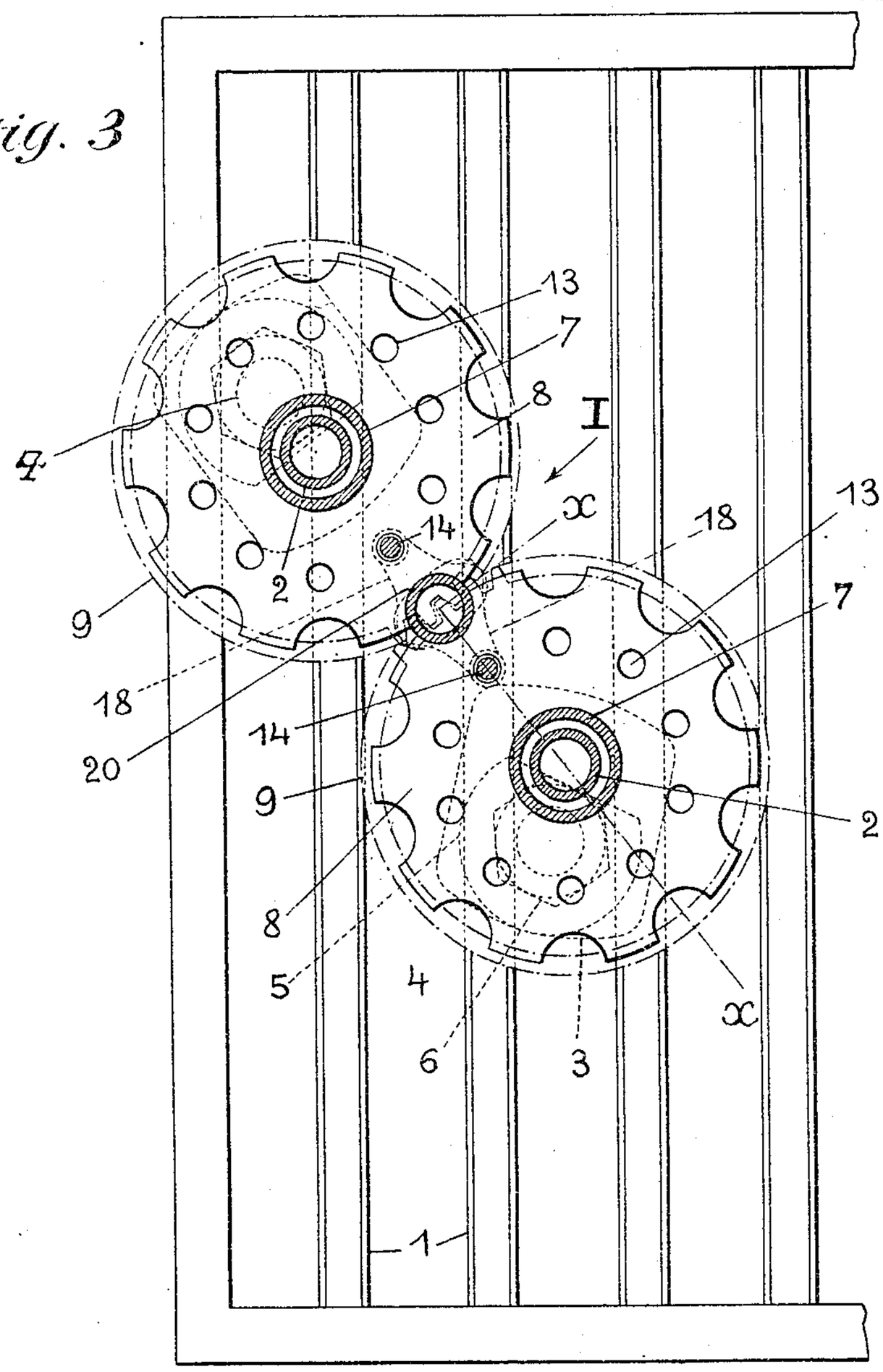
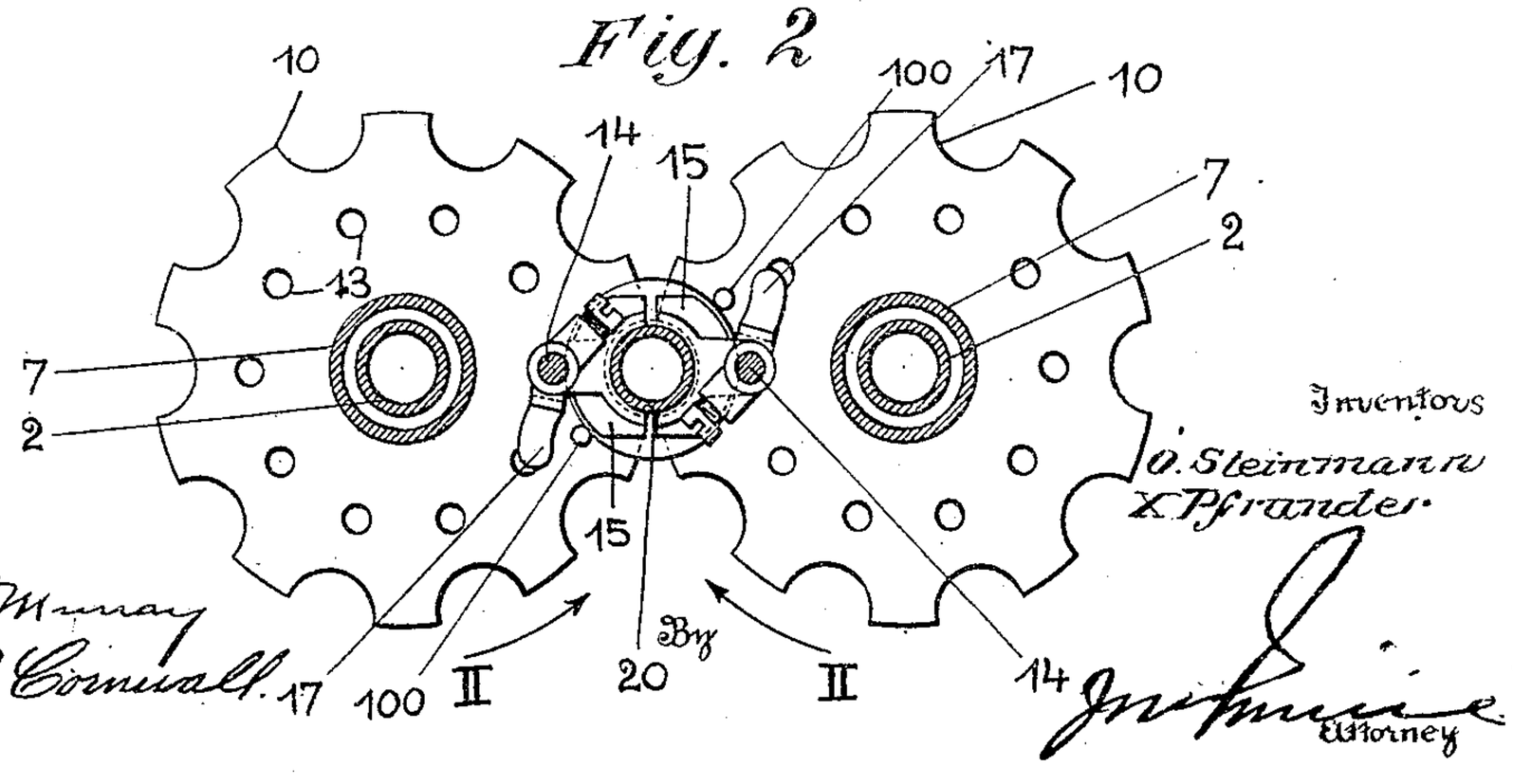


Fig. 2



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UNITED STATES PATENT OFFICE.

OTTO STEINMANN AND XAVER PFRUNDER, OF WOHLEN, AARGAU, SWITZERLAND.

BRAIDING-MACHINE.

960,122. Specification of Letters Patent. Patented May 31, 1910.

Application filed July 9, 1909. Serial No. 506,769.

To all whom it may concern:

Be it known that we, OTTO STEINMANN, a citizen of the Republic of Switzerland, residing at Wohlen, in the Canton of Aargau, Republic of Switzerland, whose post-office address is Wohlen, and XAVER PFRUNDER, a citizen of the Republic of Switzerland, residing at Wohlen, in the Canton of Aargau, Republic of Switzerland, whose post-office address is Wohlen, have invented certain new and useful Improvements in Braiding-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

In braiding machines of the kind usually employed hitherto, operating without a track plate, in which the bobbins are connected temporarily to the rotating notched disks by means of an automatic coupling, the part which releases the bobbin in the switching of the latter from one notched disk to another, has been actuated by striking against a fixed part or otherwise, independently of the actuation of the part that engages the bobbin. The consequence of that construction has been to render a braiding machine of that kind expensive to build, while there has been a great liability to disturbance in the coördinate operation of the parts carrying out the switching of the bobbins.

The present invention has now for object to provide an improved braiding machine in which the above stated drawbacks are removed by the hereinafter described arrangements.

In the improved machine, during the switching of a bobbin from one notched disk to an adjacent notched disk by means of a vertically movable coupler acting upon an annular member, the said coupler also acts upon the driver of the adjacent notched disk that is coöperating with it in the switching operation, whereby the motion of one coupler is utilized to produce directly a similar motion of the other coupler.

The chief advantages of the improved machine are:—great simplicity of construction, certainty of working and small wear and tear.

One form of the present invention is illustrated in the accompanying drawings in which:—

Figure 1 is a view of the improved machine shown partly in elevation in the direction of the arrow I in Fig. 3, and partly in vertical section in the same direction on the line *x*—*x* of Fig. 3, only two notched disks being shown for the sake of simplicity; Fig. 2 is a horizontal section on the line *y*—*y* of Fig. 1; and Fig. 3 is a horizontal section on the line *z*—*z* of Fig. 1. Figs. 4–10 are views showing details hereinafter referred to.

1 is a table constructed in the form of a grating. 2 are tubes mounted thereon eccentrically with respect to their axes and fixed thereto. 3 are plates screwed on the lower ends of the tubes 2; they carry each a screw threaded bolt 4 of smaller diameter than the width of the slots in the table, and also a washer 5 and nuts 6. This arrangement allows of adjusting and fixing the tubes 2 to suit the number of notched disks employed, without having to bore holes for them, it also allows of readily providing any further auxiliary parts without constructional alteration of the table.

A notched disk 7, 8 is mounted in a rotary manner on each tube 2, with a toothed wheel 9 and a notched plate 10. 14 are coupling rods extending through guide holes 11 and 12 of the notched disks 8 and notched plates 10 and through round holes 13 in the lower disks 8. There are as many coupling rods as there are notches in the disks 8. Each driver rod passes behind two superposed notches in the disks. Each coupling rod 14 carries near its upper end an arc-shaped coupling 15 (Figs. 1, 2, 4–6) which has an inclined under surface 16 and on one side a squarely bent arm 17 the horizontal portion of which bears normally on the notched plate 10. 100 are stop pins which are fixed vertically in the notched plates 10 and against which the arms 17 and the arcs of the coupling are adapted to strike alternately. These pins have the function of limiting the small rocking movements of the couplers 15. The lower end of each driver rod 14 carries a lifting plate 18 with a sharp edge (Figs. 1, 2, 7–9), and also a spring 19 which bears against the plate and the lower disks, and has a tendency to press the coupler rod 14 downward. On each bobbin 20 there is mounted an annular member having the form of a sleeve 22 (Fig. 10) which is

formed with a perpendicular flange 21 having a beveled upper edge extending over the corresponding notched plate 10 or two notched plates 10. For the purpose of supporting the couplers 15 on this edge each coupler is formed with a shoulder 150 (Fig. 5). A collar 220 on the sleeve 22 is designed to prevent the latter from moving upward.

The operation of the machine is as follows:—After the number of operative disks has been determined and these have been arranged and fixed in the proper manner on the table, the machine is set in motion, so that the disks begin to rotate. It is assumed that the notched plates 10 and the disks 8 are rotating in the direction of the arrows II and II (Fig. 2) and that it is required to switch the bobbins 20 from the right hand disk (Figs. 1 and 2) on to the left hand disk. The left hand coupler 15 bears with its arm 17 on the left hand notched plate 10, so long as it is not carrying the bobbin 20, while the right hand coupler 15 that is still carrying the bobbin, rests by means of the shoulder 150 in a somewhat higher position on the edge of the sleeve 22. Consequently the left hand coupler 15, the left hand rod 14 and the left hand lifting plate 18 are situated somewhat lower than the right hand coupler 15, the right hand rod 14 and the right hand lifting plate 18. Therefore in the aforesaid rotation of the notched plates 10 and the disks 8 first the right hand lifting plate 18 will meet the left hand lifting plate 18 and move up along the sharp edge of the latter for one half the thickness of the said lifting plate, whereupon the right hand coupler 15 will be raised an equal amount from the edge 21 of the sleeve 22, without being lifted entirely out of it. Immediately after this initial raising of the right hand coupler 15, the left hand coupler 15 strikes with its inclined face 16 the beveled edge of the sleeve 22 (carried by the right hand notched plate 10) and rises along the said edge. When in the continued rotation of the notched plates 10 the axis of the bobbin has come in the center line of the two disks (Figs. 1 and 2) the left hand coupler 15 has slidden over the upper edge of the sleeve 22, whereby the sleeve 22 has become engaged by the left hand coupler 15. In the ascent of the left hand coupler 15 the left hand lifting plate 18 has raised also the right hand lifting plate 18 resting on it, and has thereby effected a complete lifting of the right hand coupler 15 out of the edge of the sleeve 22 (Fig. 1), so that the latter and consequently also the bobbin can be switched from the right hand disk on to the left hand disk. In the continued rotation of the disks the right hand lifting plate 18 then slides off the left hand lifting plate, thereupon the spring 19 depresses the former and with it the right hand coupler 15, until the arm 17 moves down on to the adjacent notched plate 10. The right hand lifting plate 18 is now in such a position that after one revolution of the disk the left hand lifting plate 18 is able to move up along it in order to be raised completely by the right hand plate 18. When the left hand coupler 15 meets the edge of the sleeve 22, the former is caused to rotate slightly. By this rotation which is limited by the arm 17 striking the adjacent pin 100, the arc-shaped portion of the coupler 15 comes into a position in which it is coaxial with the sleeve 22, and in which the entire inclined face of the coupler 15 slides on the edge of the sleeve 22, and not merely a corner thereof as would be the case if there were no partial rotation. In switching the bobbins or the sleeve 22 from the left hand disk on to the right hand disk, the couplers 15 and the lifting plates exchange their functions. In order to obviate the sharp edges of the lifting plates 18 from striking each other when the bobbins are removed, the lifting plates of every two adjacent disks are arranged on slightly different levels. The lifting plates of the couplers which are not carrying any bobbins at the time, may be lifted by means of lifting pieces operated by a jacquard for the purpose of leaving the corresponding bobbins on the disks that carry them. Similarly the couplers and lifting plates that are not carrying any bobbins at the time may be lifted periodically by means of suitably arranged lifting pieces. If desired, the annular member may be a plate instead of the sleeve 22.

What we claim is:—

1. A braiding machine comprising two adjacent revolving disks formed with notches to receive bobbins, an annular member on each bobbin, couplers in each notched disk, said couplers being slidably mounted in the disks, and means for causing every two couplers, which together effect the switching operation to act one upon the other to cause them to slide vertically to engage and disengage the annular member.

2. A braiding machine comprising adjacent revolving disks formed with notches to receive bobbins, an annular member on each bobbin formed with an edge, rods mounted in each notched disk, couplers mounted on the rods, each coupler having a beveled portion and flange which coöperates with the edge of the annular member to position the couplers to engage a bobbin, a sharp lifting plate on each rod, the lifting plates carried by the rods of one set of disks being arranged at a different level from the lifting plates on the rods carried by the adjacent notched disks, whereby when two adjacent lifting plates meet, the lifting plate situated at the higher level will first move up along

the lower lifting plate and will then be raised further by the latter, as set forth.

3. In a braiding machine without a track plate, the combination with means for coupling each bobbin automatically with one of two adjacent notched disks, an annular member on each bobbin, drivers vertically movable in each notched disk, and means for causing every two couplers, which together effect the switching operation, to act one upon the other, of a table carrying the spindles of the notched disks, formed with slots, whereby any desired number of spindles may be mounted on said table without constructional alteration of the latter, as set forth.

4. In a braiding machine without a track plate, the combination with means for coupling each bobbin automatically with one of two adjacent notched disks, of an annular member on each bobbin, couplers vertically movable in each notched disk, means for causing every two couplers, which together effect the switching operation, to act one upon the other, a slotted table carrying the spindles of the notched disks, stationary tubes constituting axes of rotation for said spindles and screws disposed eccentrically to said axes for fixing said tubes on said table, as set forth.

5. In a braiding machine, the combination with rotative notched disks, of means to couple a bobbin having an annular member, to said disk, said means comprising slidable and rotatable rods mounted on the disks, beveled plates on the rods, a coupling member secured to each coupling rod, each member having a beveled surface and an annular member to coöperate with the flange on the bobbin to couple the latter to a disk, and means for returning the rods and the coupling members to normal position.

6. In a braiding machine, the combination of rotating notched disks, of means to couple a bobbin having an annular member to a disk, said means comprising slidably mounted coupling members on the disks and having coöperating beveled plates located to operate the coupling members to uncouple a bobbin on one rotating disk and couple the same bobbin on the adjacent disk in the subsequent rotation.

7. In a braiding machine, the combination of rotating notched disks, rods slidably and rotatably mounted opposite the notches in the disks, a coupling member on each rod formed with a concave face and a beveled surface and flange, a beveled plate on each rod, springs for returning the rods to normal position, and means for limiting the rotatable movement of the coupling members and rods, the concave faces embracing a bobbin and the beveled surfaces engaging a flange on the bobbin when the two beveled plates are brought together in the rotation of the disks.

8. In a braiding machine, the combination of rotating disks, each disk provided with a vertically slidable rod, a beveled plate on each rod, a coupling member on each rod having a beveled surface and flange, a bobbin having a beveled surface and flange, a bobbin having a beveled flange with which the coupling members of adjacent disk engage, the beveled plates being located so that as the disks revolve and said plates engage, one of the coupling members will be slightly raised and the beveled surface of the opposite coupling member will contact with the beveled flange on the bobbin and disengage the coupling member previously raised from said bobbin flange, means for returning the previously elevated coupling member to normal position and means for lowering the other coupling member to fit over and engage the flange on the bobbin.

9. In a braiding machine, the combination of revolving notched disks, coupling members to couple a bobbin having an annular member to one of said disks, means cooperating with two coupling members when brought adjacent each other for primarily elevating one coupling member and upon subsequent movement of the disks to elevate both said coupling members above the flange on the bobbin, and means for causing engagement of the second coupling member with the flange, and means for returning the coupling members which were previously elevated to normal position.

10. A braiding machine, comprising two adjacent revolving notched disks, an annular beveled member on each bobbin carried by the disks, arc shaped couplers having inclined surfaces, said couplers mounted to turn with the disks, and a coöperating lifting member for each coupler, whereby when two couplers on adjacent disks, approach each other they will turn slightly independently of the revolving movement of the disks to embrace a bobbin, and the two adjacent lifting members of said couplers will be engaged, and the beveled surface of the annular member and the beveled surfaces of the couplers will also engage to bodily move said couplers vertically, and cause one of them to engage over the annular member on the bobbin, and the adjacent coupler to be disengaged from said annular member.

In testimony whereof, we have signed our names to this specification in the presence of two subscribing witnesses.

OTTO STEINMANN.
XAVER PFRUNDER.

Witnesses:
HERMANN HUBER,
CARL GUBLER.