No. 847,005. PATENTED MAR. 12, 1907.

J. E. KIRBERG.

BRAIDING MACHINE.

APPLICATION FILED APR. 13, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

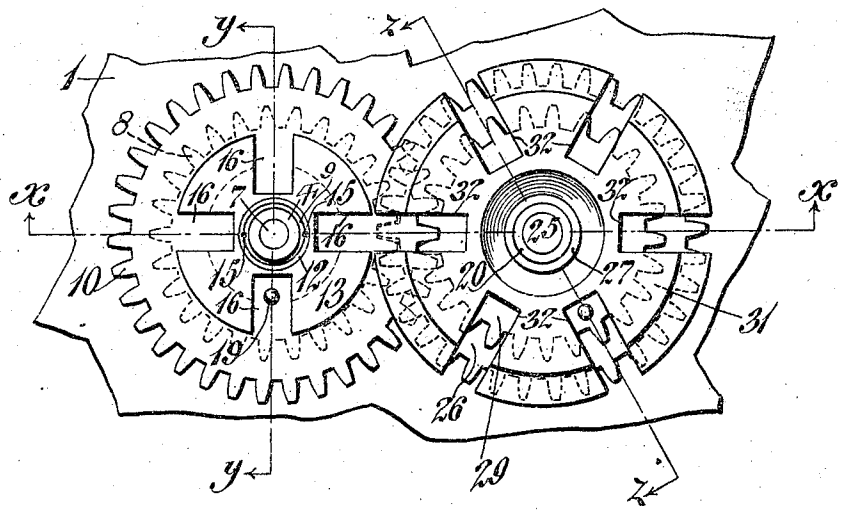


Fig. 2.

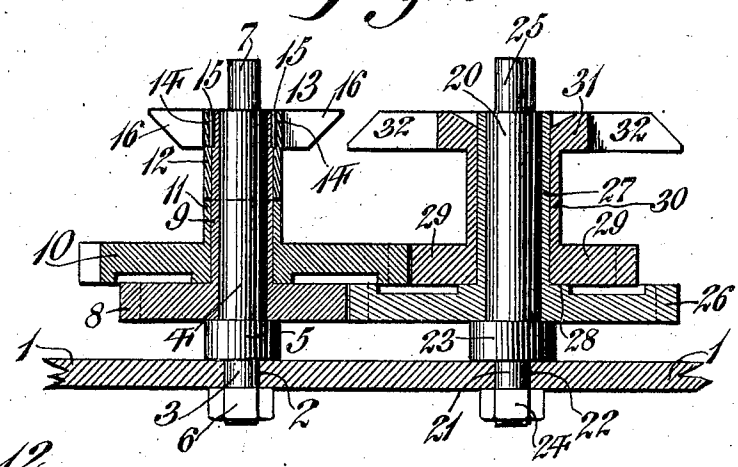


Fig. 12.

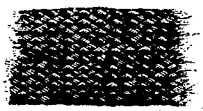
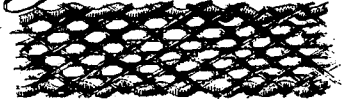


Fig. 13.

Fig. 14.



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3 SHEETS—SHEET 2.

fig. 7.

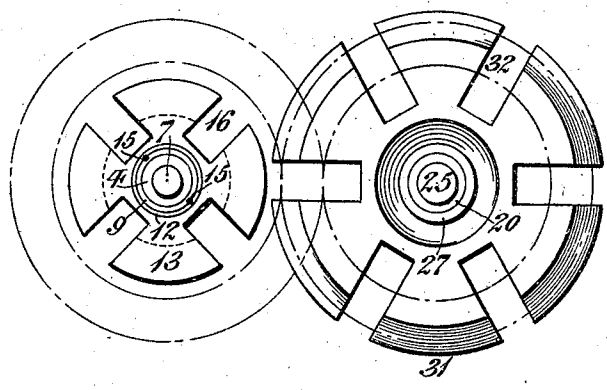

fig. 3.

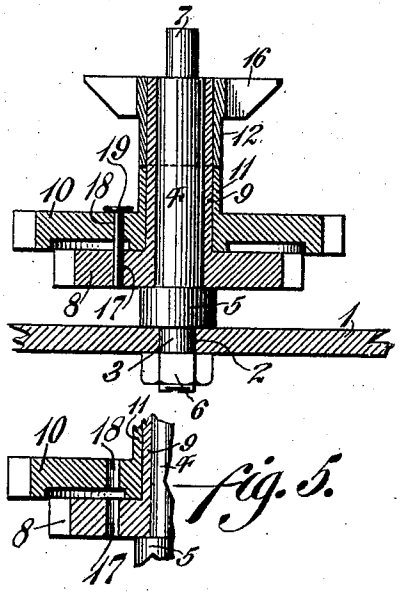

fig. 4.

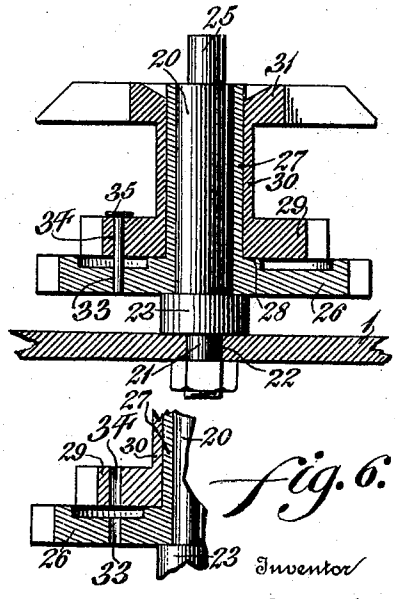

fig. 5.

fig. 6.

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3 SHEETS—SHEET 3.

Fig. 8.

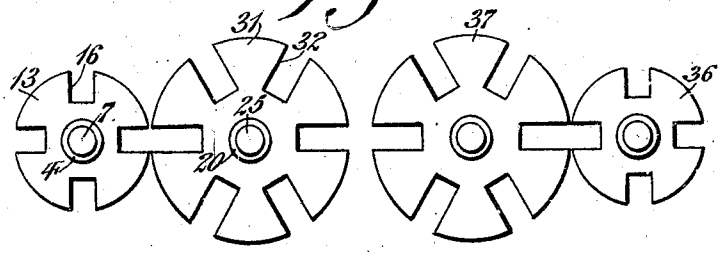


Fig. 9.

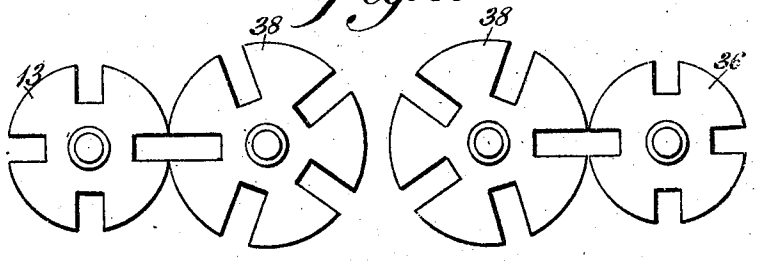


Fig. 10.

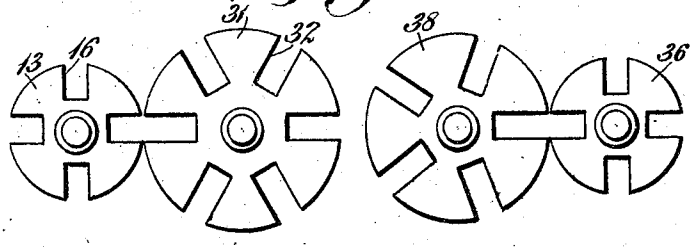
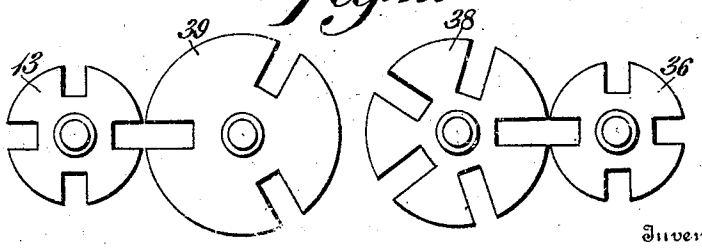


Fig. 11.



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UNITED STATES PATENT OFFICE.

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BRAIDING-MACHINE.

No. 847,005. Specification of Letters Patent. Patented March 12, 1907.

Application filed April 13, 1906. Serial No. 311,499.

To all whom it may concern:

Be it known that I, JACOB E. KIRBERG, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Braiding-Machine, of which the following is a specification.

My invention relates to braiding-machines, and consists of a novel construction by the employment of which the machine may be readily and quickly adapted for producing a different kind of braid without dismantling the machine.

A further object of my invention is to so construct the end wheels of the trains and their adjuncts that when it is desired to produce a different kind of braid it will be unnecessary to change more than one of these gears.

In the present instance I have shown but one combination which is produced; but it will be apparent that other combinations may be made, and for convenience of illustration I have shown the end wheels of the train as adapted to produce a diamond braid, in which each of the end wheels are provided with six notches or slots coacting with wheels having four notches or slots therein. In order to produce an open braid, one of the end wheels of the train which forms the selvage must have five notches or slots therein, and the other end wheel of the train must have three notches or slots therein.

Heretofore in order to adapt the machine to produce an open braid, in which the end wheels of the train have the relation of five to three to the other wheels, when the machine is arranged for producing a diamond braid it has been necessary to change both of the end gears of the train. One of the wheels having six notches therein is replaced by a wheel having five notches therein, and the other wheel having six notches or slots therein is replaced with one having three notches therein. By the employment of a construction such as herein shown it is only necessary to replace one of the wheels having six notches with a wheel having five notches thereon, the other end wheel of the train which forms the selvage being adapted to be so adjusted that it is unnecessary to replace the same, said wheel being so driven that it performs the same function as a wheel having three notches therein.

To the above ends my invention consists, broadly, of a novel construction and arrangement of gearing by means of which the end wheel having six notches therein is connected with respect to the other wheels of the train in such a manner that by adjusting a suitable fastening device this end or selvage wheel will perform the same purpose as if a wheel having three notches or slots therein was substituted therefor.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

Figure 1 represents a plan view of a portion of a braiding-machine embodying my invention having certain parts thereof removed for clearness of illustration. Fig. 2 represents a section on line *x x*, Fig. 1. Fig. 3 represents a section on line *y y*, Fig. 1. Fig. 4 represents a section on line *z z*, Fig. 1. Fig. 5 represents a sectional elevation of a detached portion of Fig. 3. Fig. 6 represents a sectional elevation of a detached portion of Fig. 4. Fig. 7 represents a plan view of my device, showing the wheels in a different relation to each other. Fig. 8 represents a plan view of a portion of the braiding-machine, showing the same as adapted to produce a diamond braid. Fig. 9 represents a plan view of a portion of a braiding-machine, showing the same as adapted to produce a flat braid. Fig. 10 represents a plan view of a portion of a braiding-machine, showing the same as adapted to produce an open braid. Fig. 11 represents a plan view of a portion of a braiding-machine adapted to produce an open braid, but in which it is necessary to change both of the wheels which form the selvage. Fig. 12 represents a plan view of a portion of a diamond braid. Fig. 13 represents a plan view of a portion of a flat braid. Fig. 14 represents a plan view of an open braid.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, I have deemed it unnecessary to illustrate and describe the complete train of wheels and gearing, since the same *per se* forms no part of my present invention and since my invention relates

more especially to a novel construction and arrangement of parts whereby the end or selvage wheel may be driven at a different speed, and thus dispense with one of the gears and wheels heretofore employed.

In machines of this character a plurality of wheels are employed having a similar number of notches or slots, as is well known in the art, in each wheel with the exception of the end wheels, which form the selvage, and by changing the number of notches or slots in said end wheels a different braid is produced.

1 designates a base-plate having an aperture 2 therethrough, through which the reduced end 3 of the spindle 4 passes, said spindle being provided with an enlargement 5 and being secured with respect to the base-plate 1 by means of a suitable fastening device, such as a nut 6, the outer end 7 of said spindle being suitably reduced, if desired, in order that the top plate (not shown) may be secured thereon.

8 designates a gear mounted on the spindle 4 and having extending upwardly therefrom a hub or sleeve 9, which terminates in the present instance near the beginning of the reduced end 7.

10 designates a gear mounted on the hub 9 and having an outwardly-extending hub or flange 11, on which is adapted to be seated the collar or sleeve 12, to which is secured in any suitable manner the wheel 13, it being noted that both the gear 10 and the collar 12 are mounted on the outwardly-extending hub or sleeve 9, carried by the gear 8. In order to prevent any relative movement of the wheel 13 and the hub 9, I recess the upper end of the hub 9 and the upper end of the sleeve 12 contiguous thereto, as seen at 14. In this recess I have fixed a suitable fastening device, such as pins 15, by means of which the wheel 13 is fixed relative to the sleeve or hub 9. The wheel 13 has in the present instance four notches or slots therein, as indicated at 16, and it is to be understood that the number of wheels employed having a similar number of slots or notches therein would vary according to the conditions and requirements.

17 designates an aperture extending into or through the gear 8.

18 designates an aperture in the gear 10.

19 designates a pin which is adapted to fit said apertures in order to maintain the gears 10 and 8 in fixed relation with respect to each other, so that when desired they will move in unison.

20 designates a spindle having a reduced end 21, which passes through the aperture 22 in the base-plate 1, there being a shoulder 23 on said spindle which is held in suitable relation with respect to the base-plate 1 by means of suitable fastening devices, such as a nut 24, it being seen that the opposite end of the spindle 20 is reduced, as seen at 25, in a manner similar to the spindle 4 in order that the top plate of the device may be fastened thereon.

26 designates a gear mounted on the spindle 20 and provided with an upwardly-extending hub or sleeve 27, thus forming a shoulder 28, against which abuts a gear 29, having an upwardly-extending hub or sleeve 30, which is mounted on the hub 27 and is provided at its upper end with a wheel 31, which is integral therewith or secured thereto in any suitable manner. The wheel 31 is provided in the present instance with six notches 32. The gear 26 meshes with the gear 8, and the gear 29 meshes with the gear 10. The gears 29 and 26 may be fixed relative to each other, if desired, owing to the provision of an aperture 33, extending into or through the gear 26 and the aperture 34 in the gear 29, there being a suitable fastening device, such as a pin 35, passing through said apertures. It will now be apparent that when the pin 19 is removed and the pin 35 is left in position the gear 8 will serve as a driving member to actuate the wheel 32, said gear 8 coacting with the gear 26, and in this case the gear 10 acts as an idler. In case the pin 35 is removed and the pin 19 is left in position the gears 10 and 8 are moved in unison, and the gear 10, coacting with the gear 29, will serve as a driving member for the wheel 32, the gear 26 in this case acting as an idler.

In Fig. 8 I have shown a portion of a braiding-machine having certain parts thereof removed for clearness of illustration, the machine in this instance being adapted to produce a braid such as seen in Fig. 12, the wheels of the train each having four notches or slots therein and the end or selvage wheels of the train having six notches or slots therein. In order to produce a braid such as is shown in Fig. 13, it is necessary to remove both of the wheels having six slots therein and replace the same with wheels having five slots therein, and in order to produce an open braid, such as indicated in Fig. 14, it is essential to replace the end wheels which form the selvage and have six slots therein, one of said wheels being replaced by a wheel having three slots therein and the other end wheel being replaced by a wheel having five slots therein.

In machines of this character as heretofore constructed it has been necessary to remove each of the wheels having six slots therein in order to arrange the machine for producing an open braid; but by the employment of my present construction it is only essential to remove one of these wheels, and the necessity of employing a wheel having three slots therein is dispensed with.

36 designates one of the wheels of the train having four slots therein.

37 designates one of the wheels having six notches or slots therein.

38 designates a wheel having five notches or slots therein, and 39 designates a wheel having three slots therein.

The operation of my invention will now be readily apparent and is as follows: If the machine is arranged, as seen in Fig. 8, to produce a diamond braid, such as is shown in Fig. 12, the end wheels of the gearing will each have six notches or slots therein and the coacting wheels of the train will have four notches or slots therein. If a construction embodying my invention is employed and the pin 19 removed, the gear 10 travels as an idler and the gear 8 acts as a driving-gear, and in this case the wheel 31 will be rotated in such a manner that each alternate slot 32 therein will register with one of the slots 16 in the wheel 13, as indicated in Figs. 1, 2, and 8. In case a flat braid, such as shown in Fig. 13, is to be produced, each of the end gears of the train will have five slots therein, and it is necessary to replace each of the wheels having six slots therein, as indicated in Fig. 8, with wheels having five slots therein, as indicated in Fig. 9. This will produce a braid such as shown in Fig. 13. If it is desired to produce a braid such as shown in Fig. 14, one of the end wheels of the train must have five slots therein and the other have three slots therein, as indicated in Fig. 11. In my construction I have dispensed with the necessity of employing a separate gear adapted to actuate a wheel having three slots therein, and I accomplish this by so gearing the next to the last wheel of the train and the end wheel of the train in such a manner that either six slots in said wheel will register with the slots in the next to the last wheel or so that every other slot in the end wheel will register with a slot in the next to the last wheel. In this case it is only necessary to replace one of the last wheels of the train with a wheel having five slots therein, the other end wheel being adjusted in the following manner: The fastening device 35 is removed and the fastening device 19 is left in place, so that the gears 10 and 8 move in unison, and the wheel 26 serves as an idler, and the gear 10 serves as a driving member for the gear 29, and since the gear 10 has a larger number of teeth than the gear 29 it will be apparent that the gear 29 will be rotated more rapidly than in case the gear 10 served as an idler and the gear 8 serves as a driving member for the gear 26. In case the gear 10 serves as a driving member the wheel 31 is rotated in such a manner that every other slot 32 will register with a slot 16. In Fig. 7 I have shown the manner in which the wheels 31 and 13 would rotate, said wheels being shown in their intermediate position, so that every alternate slot in the wheel 31 would register with a slot in the wheel 16.

If the machine be adapted to produce an open braid and it is desired to produce a diamond braid, the wheel having five notches or slots therein would be replaced by one having six notches therein, and the pin 19 is removed, so that the gear 8 acts as a driving member, and each slot in the wheel 31 would register with a slot 16 in the wheel 13.

It will thus be seen that a machine having a construction embodying my invention connected therewith does away with the necessity of employing a wheel having three slots therein, since a wheel having six slots therein may be employed, and by employing either the fastening device 35 or 19 said end wheel may be readily adapted to perform the same function as separate wheels, the one having six slots therein and the other having three slots therein. I have deemed it unnecessary to show or describe in detail the construction and operation of a complete machine, since the same is well known to those skilled in this art and since any well-known form of braiding-machine would be employed.

For convenience of illustration I have shown one form of fastening device which may be employed to fasten the different gears together, but it is apparent that any means may be employed for fixing the gears with respect to each other and still be within the scope of my invention.

It will be apparent that in my present construction I dispense with the employment of a wheel having three slots therein, and, furthermore, a large amount of time is saved in changing the machine so that it will produce either a diamond braid or an open braid, since it is only essential to replace one of the end gears and remove either the pin 19 or 35.

It will be apparent from the foregoing that I have produced a novel and useful construction of braiding-machine, in which both time and material are saved and which embodies the features of advantage enumerated in the statement of invention and the foregoing description, and while I have in the present instance described the preferred embodiment thereof it is to be understood that it is susceptible of modification in various particulars without departing from the spirit and scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a braiding-machine, a wheel having four slots therein, an end wheel having six slots therein, and means for rotating said latter wheel so that every other slot registers with a slot in said first wheel.

2. In a braiding-machine, a wheel having slots therein, a gear fixed relative to said wheel, a gear intermediate said wheel and said fixed gear, a wheel having six slots therein, a gear carried thereby and adapted to engage said intermediate gear, a second gear on which said latter gear is mounted and

coacting with said fixed gear, and means for causing either said fixed gear or intermediate gear to act as a driving member.

3. In a braiding-machine, a wheel having four slots therein, an end wheel having six slots therein, means for rotating said end wheel so that every slot therein registers with a slot in said first wheel, and means for effecting the rotation of said end wheel so that every other slot therein registers with a slot in said first wheel.

4. In a braiding-machine, a train of wheels having a similar number of slots therein, an end wheel having a different number of slots therein, means for rotating said end wheel to cause each slot therein to register with a slot in one of the other wheels, and means for rotating said end wheel so that only a portion of the slots therein register with the slots in one of said other wheels.

5. In a braiding-machine, a spindle, a gear having an extending hub mounted on said spindle, a wheel having four slots therein fixed to said hub, a second gear loosely mounted on said hub intermediate said wheel and said first gear, a second spindle, a gear having an extending hub mounted thereon and coacting with said first gear, a gear loosely mounted on said hub and coacting with said second gear, a wheel having six slots therein carried by said loosely-mounted gear, and means for causing the gears carried by either the first or second spindle to move in unison.

6. In a braiding-machine, a spindle, a gear having an extending hub mounted on said spindle, a wheel having four slots therein fixed to said hub, a second gear loosely mounted on said spindle intermediate said wheel and said first gear, a second spindle, a gear having an extending hub mounted thereon and coacting with said first gear, a gear loosely mounted on said hub and coacting with said second gear, a wheel having six slots therein carried by said former gear, and removable means for causing the gears carried by either the first or second spindle to move in unison.

7. In a braiding-machine, a spindle, a gear thereon having an extending hub, a second gear loosely mounted on said hub, a wheel having four slots therein fixedly carried by said hub, a second spindle, a gear having an extending hub loosely mounted thereon and engaging said first gear, a second gear loosely mounted on said hub, a wheel having six slots therein carried by said last gear, said last gear coacting with the second gear mounted on the first spindle, and means for causing either the first or second gear on the first spindle to act as a driving means for the wheel carried by the second spindle.

8. In a braiding-machine, a spindle, a gear having an extending hub mounted thereon, a second gear having a larger diameter loosely mounted on said hub, a wheel having four slots therein fixedly carried by said hub, a second spindle, a gear having an extending hub loosely mounted thereon, a second gear loosely mounted on said second spindle and having an extending hub, a selvage-wheel carried by said hub, the second gear on said first and second spindle coacting with each other, the first gear on the first and second spindle coacting with each other, and a removable fastening device engaging the first and second gear on one of said spindles.

9. In a braiding-machine, a spindle, a gear having an extending hub mounted thereon, a second gear loosely mounted on said hub and having a larger diameter than said first gear, a wheel having four slots therein carried by said hub, a second spindle, a gear mounted thereon and coacting with the first gear of the first spindle, said gear on the second spindle having an extending hub, a second gear loosely mounted thereon and having an extending hub and coacting with the second gear on the first spindle, a wheel having six slots therein carried by the hub of the second gear on the second spindle, the second gear on the second spindle having a smaller diameter than the first gear thereon, and removable means engaging the two gears on the first spindle to cause the same to move in unison.

10. In a braiding-machine, a spindle, a gear having an extended hub mounted thereon, a second gear loosely mounted on said hub and having a larger diameter than said first gear, a wheel having four slots therein carried by said hub, a second spindle, a gear mounted thereon and coacting with the first gear of the first spindle, said gear on the second spindle having an extending hub, a second gear loosely mounted thereon and having an extending hub and coacting with the second gear on the first spindle, a wheel having six slots therein carried by the hub of the second gear on the second spindle, the second gear on the second spindle having a smaller diameter than the first gear thereon, and removable means engaging the two gears on either spindle to cause said gears to move in unison.

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