F. W. PLUMB.

BRAIDING MACHINE.

APPLICATION FILED AUG. 3, 1909.

1,005,574.

Patented Oct. 10, 1911

3 SHEETS—SHEET 1.

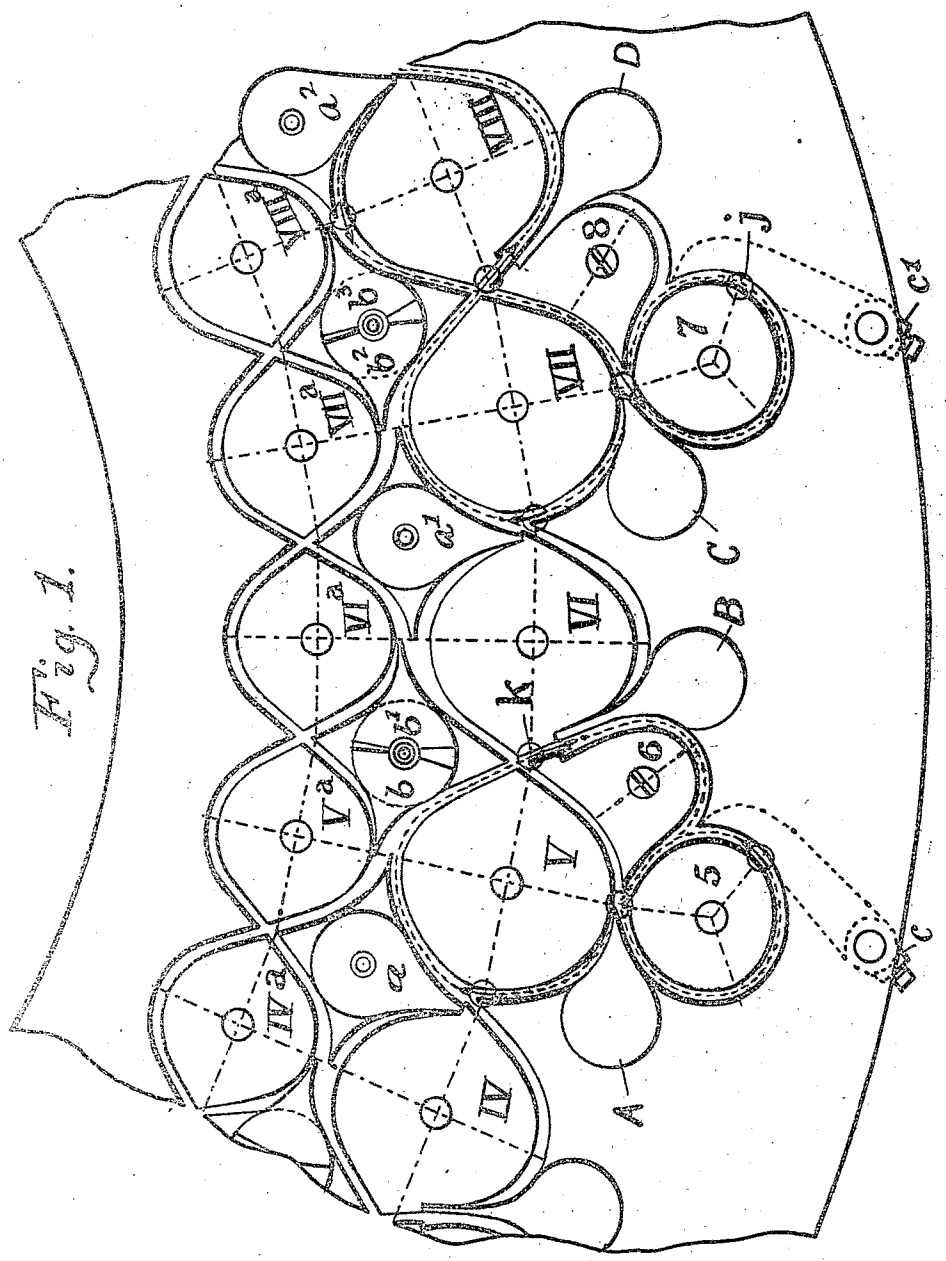

Fig. 1.

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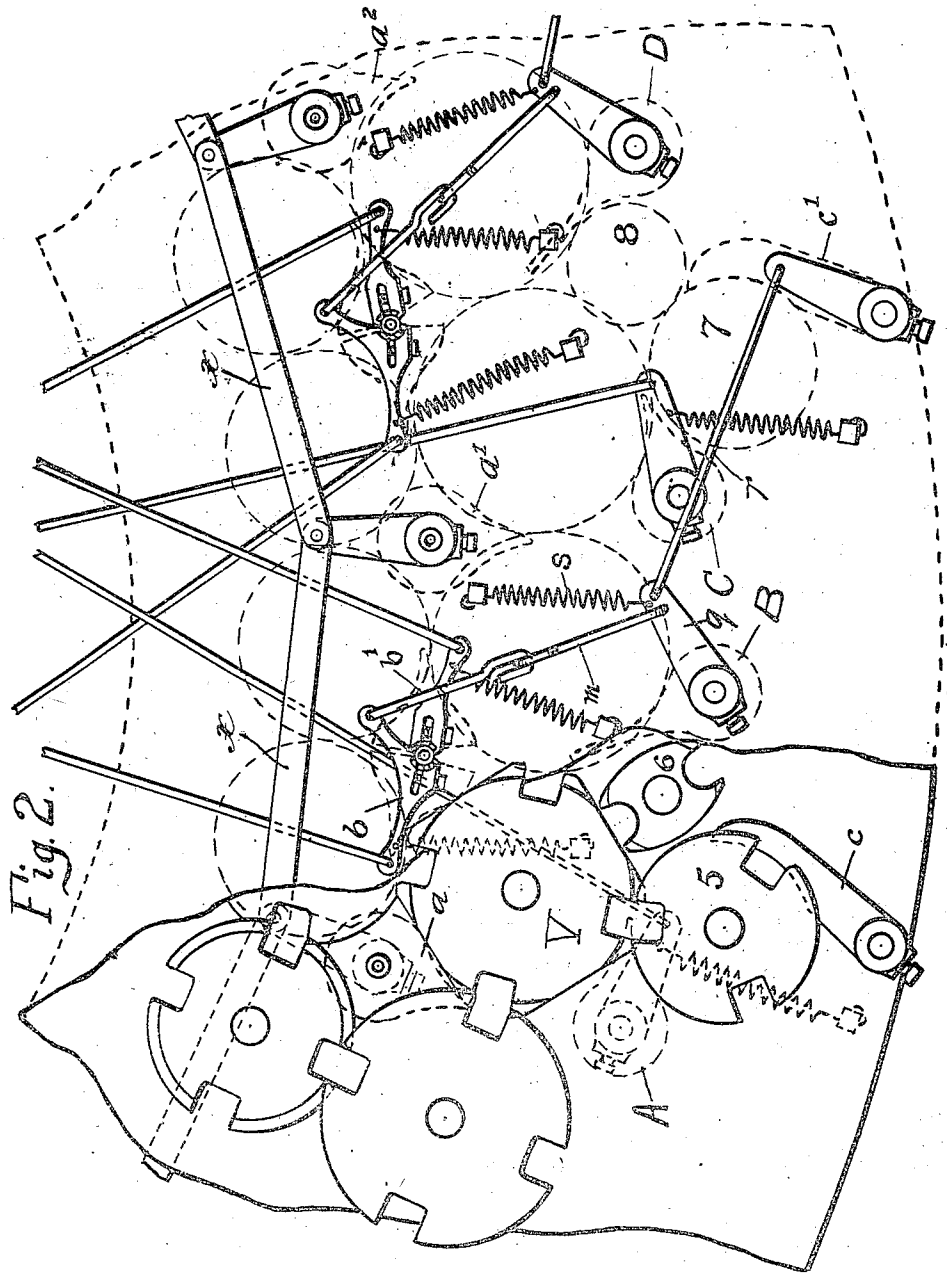

Fig. 2.

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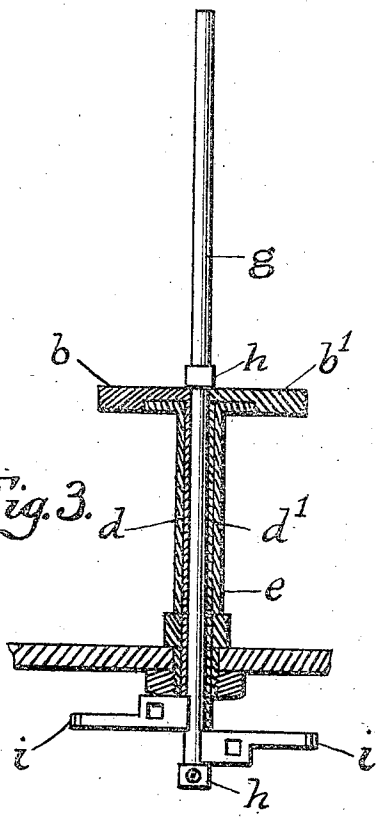

Fig. 3.

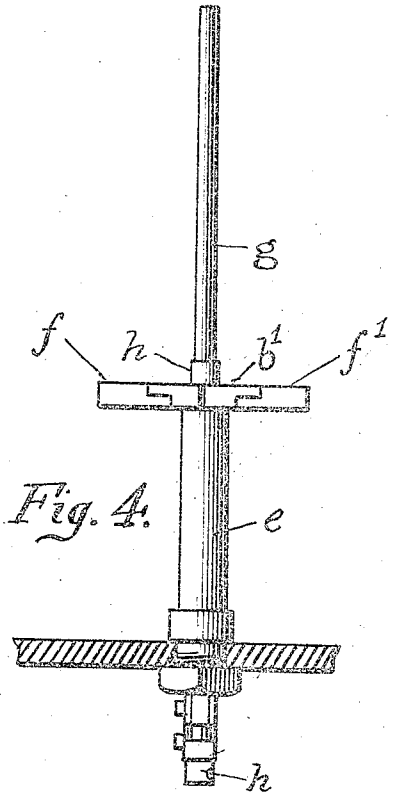

Fig. 4.

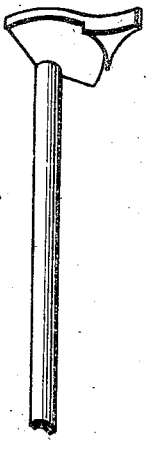

Fig. 5.

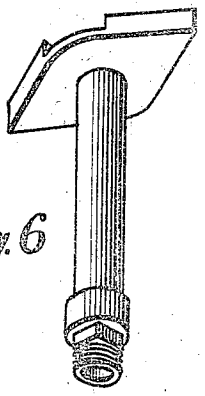

Fig. 6.

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UNITED STATES PATENT OFFICE.

FREDERIC W. PLUMB, OF NEW YORK, N. Y., ASSIGNOR TO THE SUTRO BROS. BRAID CO., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

BRAIDING-MACHINE.

1,005,574. Specification of Letters Patent. Patented Oct. 10, 1911.

Application filed August 3, 1909. Serial No. 510,992.

To all whom it may concern:

Be it known that I, FREDERIC W. PLUMB, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Braiding-Machines, of which the following is a specification.

This invention relates to improvements in braiding machines for the production of what are known as "radium" braids which have figured or embroidery effects of overlying threads with or without warp and lace effects. Patents for such braiding machines have been granted in Germany to Gustav Kranzler, January 22, 1891, #55401; Alfred Ortmann, December 13, 1906, #179886; Louis Brun, April 19, 1907, #184045; and in the United States to Bernard Lepperhoff July 21, 1908, #894022. It is more particularly to machines of the last type that these improvements apply. The effect of these improvements has been to reduce the number of parts, to prevent the colliding of carriers, and to give increased production. My invention can also be applied to braiding machines having only one circle of gears thereby making of any flat or tubular braider, a two thread lace machine. In this case only one half the usual number of braiding carriers are employed. In braiding machines of this latter construction, it is possible to confine or restrict in certain portions of the raceway groups of carriers thereby producing stripe effects.

The invention is fully described in connection with the accompanying drawings and the novel features are especially pointed out.

Figure 1 is a plan of part of a braiding machine having two circles of gears showing the communicating raceways with switches controlling the movements of the carriers therein. Fig. 2 shows on the left a group of horn gears from the same machine, the top plate having been removed, and on the right both plates are removed to show the manner of joining the switch levers. Fig. 3 is a sectional elevation of one pair of vibrating switches. Fig. 4 is a side view of Fig. 3. Fig. 5 is a perspective view of one of the switch tongues with its semi-tubular stem. Fig. 6 is a perspective view of the stationary tubular switch post.

In Fig. 1 are shown by means of small circles having arrows crossing their diameter, the braider carriers. The dotted lines in the raceway at the left, represent the path when forming a figure 8 or soutache effect. As may be seen, switch B is opened for the oncoming carrier *k* by means of a lever *c'* under the top plate and just under the flange of horn gear 7 and against which the pin *j* on the bottom of the carrier bears, said lever being connected to the arm *q* of switch B by means of a wire *r* under the bottom plate, best seen in Fig. 2. A spring *s* is connected to the switch B and when the pin *j* of the carrier strikes the cam lever *c'* it actuates the lever to move the switch against the tension of the spring. This construction which is novel in braiding machines and to which I desire to call particular attention has several important functions. It does away with the use of a jacquard machine or a cam to work these switches, the switch cannot open unless a carrier passes around horn gear 7 hence all danger of collisions is avoided from defective pattern cards or broken jacquard mechanism and the switch is always opened at exactly the right time. Another important point is, that although switches B and C must open at the same time as seen in Fig. 1 where the pins *j* and *k* of the carriers are shown as passing the points of these switches at the same moment when turning carriers back to produce lace effects, it is always necessary that a carrier coming from the left side should be allowed to pass switch B, before the latter is opened and a carrier is at the same moment starting to go about the outrun to its right. If this were not done there would be too many carriers in the section to the left of the switch B, and a collision would ensue, because there would not be enough horns in the gears to provide passage for that carrier. This is made possible by placing the cam lever *c'*, which is moved by the usual pin *j*, affixed below the foot of the braider carrier in such position that it only begins to open the switch when the carrier has passed about

two-thirds of the race circle of horn gear 7 and holds it open until the pin *j* of a carrier is well past the point. For a like reason when lace or stripe effects are being produced, it is necessary to prevent carriers passing from the outer or main raceway to the inner raceway through switch *b* should the pattern cards be defective or the jacquard mechanism fail. I have connected switch *b* to switch B by means of a linked wire *m* in two parts. When so connected, the carrier which opens and controls switch B also holds switch *b* closed so that no carrier can run out, thus effectually preventing collisions through such a cause. The wire connection, when switch *b* is wanted for radium effects because of being linked together, slides on itself and does not affect switch B. It has not been found necessary to control the other switch *b'* of the pair because no carriers can get past switch a^1 which is always vibrating, being positively driven by an eccentric or cam for which no novelty can be claimed as such controlled switches are well known in an old type of French braiding machine. One eccentric or cam drives the whole circle of switches *a a' a²* which are linked together by means of flat connecting straps *x x* under the bottom plate.

In Fig. 2 can be seen the manner in which the two-horn gear 6 and the three-horn gear 5 are applied to the four-horn gear V to form a figure 8 raceway of a three and five horn gear which is necessary for lace effects. This is believed to be novel as heretofore this effect has always been produced by adding three and five horn gears to the main raceway or by the use of long and short horn gears, as in U. S. Patent #894,022. The use of five horn gears as outruns in two concentric circle braiding machines, is objectionable as it causes the braider carriers to travel over a long distance from the inner circle of gears through the main circle and thence around the five horn outrun. In a "radium" braider so built, this distance would be ten inches which would cause the tension weights to rise five inches requiring a very high carrier, at least ten inches from the top plate to the thread eye in its top. Such a carrier does not wear well in practice, owing to the effect of centrifugal force in passing around the horn gear circles. With the long and short horn gear method of forming a five horn gear of a four horn gear, it has been found in practice that the shock of coming to a stop and being carried forward by the long horn, necessitates slowing down the speed of the machine considerably and hence a lessened production, besides if the raceway is not formed with care, there is danger of the carriers slipping off the short horns at some other point than the place desired. In my invention the two horn gear is so applied as to add but one horn to the four horn gear to which it is geared. Fig. 2 shows how this is done, at 6. In practice this makes a very easy run for the carriers to travel in and hence no reduction in the normal speed of the braiding machine is needed.

The double vibrating switch shown in Figs. 3 and 4 is quite different from that shown in German patent of December 13, 1906, #179,886 and used in all "radium" braiding machines. In that switch there are used two switch points or tongues brazed to tubes, the one telescoping inside the other. There is danger in such a device of one tube sticking to its mate or that the set screw of the crank arm which actuates the outer tube may be tightened too much and cause it to stick to the inner tube. In such cases, both switches work together and either spoil the braid because carriers run out of place, or cause carriers to collide with the point of the switch that is sticking to its mate. It is also not possible to use very large warp filling tubes in such a switch because the stationary tube or post in which the telescoped tubes vibrate has to be kept quite small in diameter to permit the bottom flange of the carriers to pass it. Lack of room for switches caused the abandonment of the German Pat. No. 55,401 above cited, which showed two independent single tongue switches side by side. In order to make room for these switches very large horn gears had to be used. This resulted in a very costly machine and slow production. The telescopic switch allowed the use of standard horn gears of 76 mm. pitch diameter for the inner circle of gears and made the "radium" braiding machine a commercial possibility.

My invention not only takes up less room, but allows the use of a much larger warp filling post or tube so that braided or other large warp fillings can be used and a larger variety of pattern effects obtained. The switch stems being all alike, makes this a cheaper switch to construct. There is also no danger of one switch tube sticking to the other from any cause. As will be seen in Figs. 3 and 4 this device consists of two similar tongues or switch points *b, b'* secured to semi-tubular stems *d, d'*. These are supported by a stationary tube or post *e* to which is brazed the points *f, f'* which complete the raceways.

g is a loose tube kept in place by small collars, *h* which acts as a pivot about which the semi-tubular stems of the switches vibrate and also as a warp filling post.

To actuate the switches I use small crank arms *i* which are clamped to the semi-tubular stems *d, d'*.

Fig. 5 is a perspective view of one of the

switch points with its stem which is self explanatory as is also the tubular switch post in Fig. 6.

While a preferred construction and arrangement of parts are specifically shown and described they may be modified without departing from the invention.

I claim:—

1. In a braiding machine, a series of supplementary out-running raceways formed by the combination of a two-horn gear and a three-horn gear with a four-horn gear circle, together with studs and plates and single and double vibrating switches to form a soutache (figure **8** raceway of a three-horn gear and a five-horn gear equivalent.

2. In a braiding machine, a vibrating switch, a vibrating cam lever, a connecting rod between said switch and said cam lever, a spring attached to said cam lever and to said switch, a second switch connected to the vibrating switch, a braiding carrier having a pin to engage the cam lever to move the first switch against the tension of the spring.

3. In braiding machines a double vibrating switch, each tongue having a semi-tubular stem in combination with a loose central tube forming a pivot and an outer stationary tubular supporting post.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FREDERIC W. PLUMB.

Witnesses:

CHRISTIAN ALMSTAEDT,

WM. E. WARLAND.