

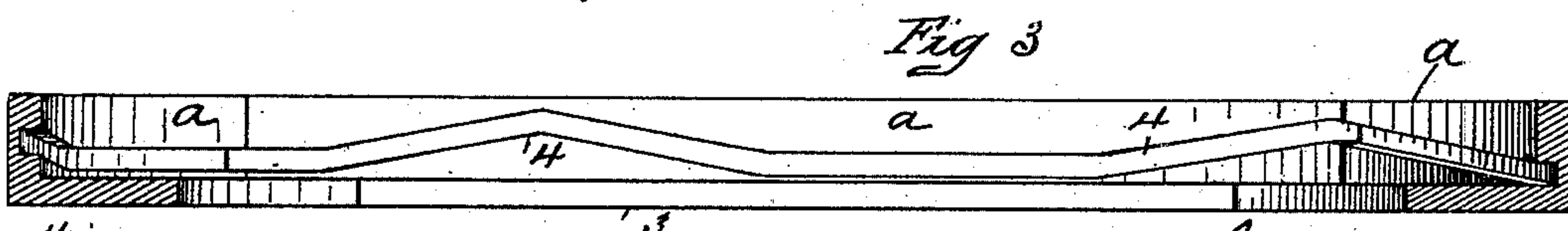
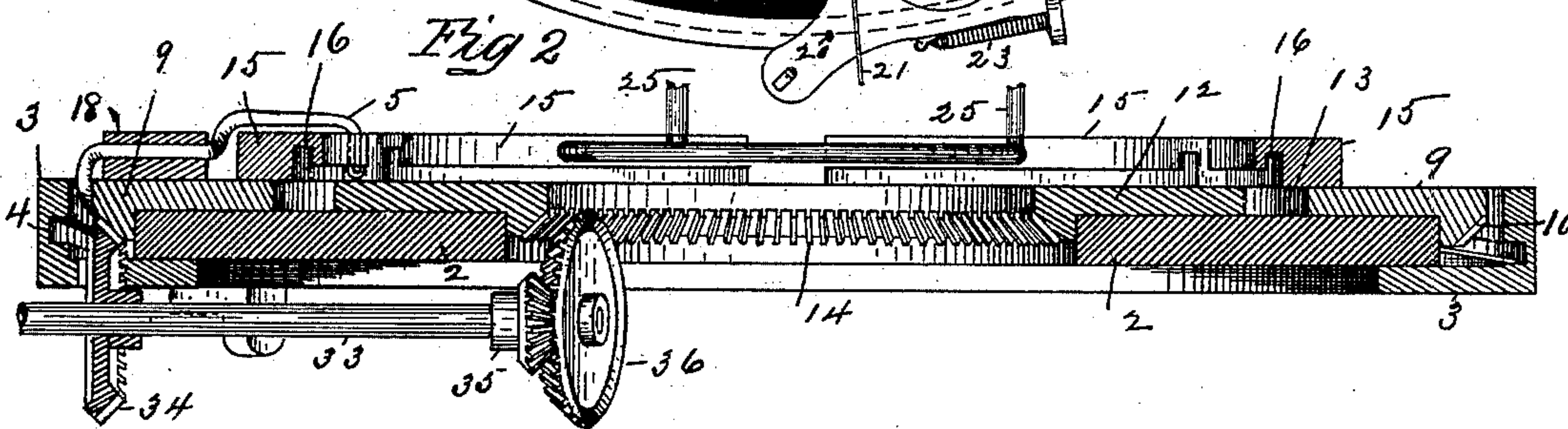
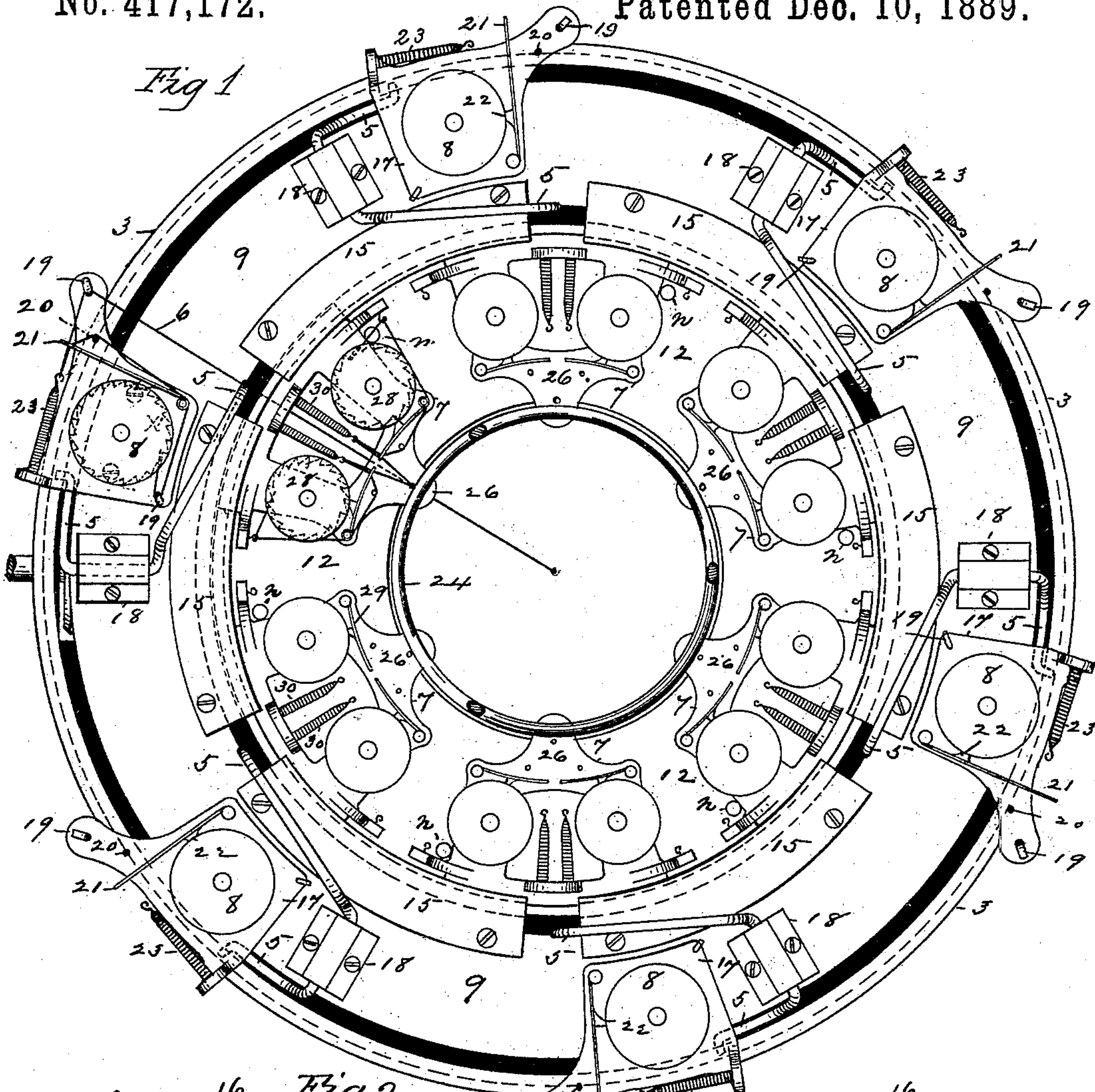
(No Model.)

2 Sheets—Sheet 1.

D. D. GRIFFIN.  
BRAIDING MACHINE.

No. 417,172.

Patented Dec. 10, 1889.



Witnesses  
Wm. Chapin  
G. M. Chamberlain.

Inventor  
D. D. Griffin  
By Chapin & Co.  
attys.

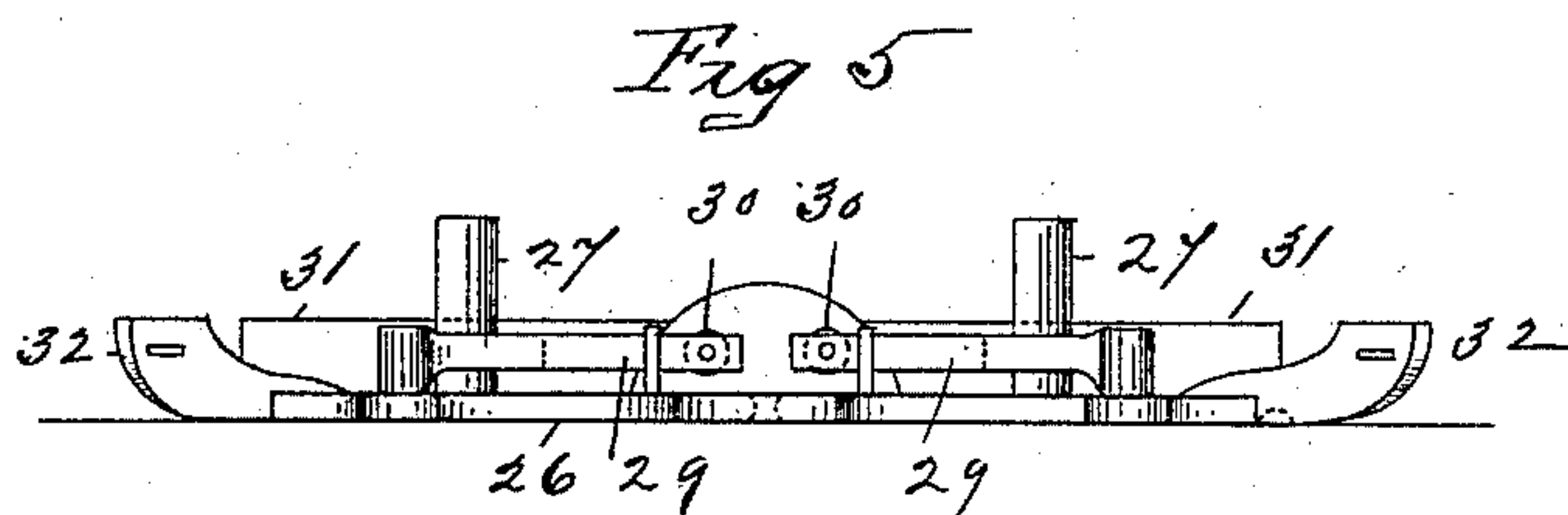
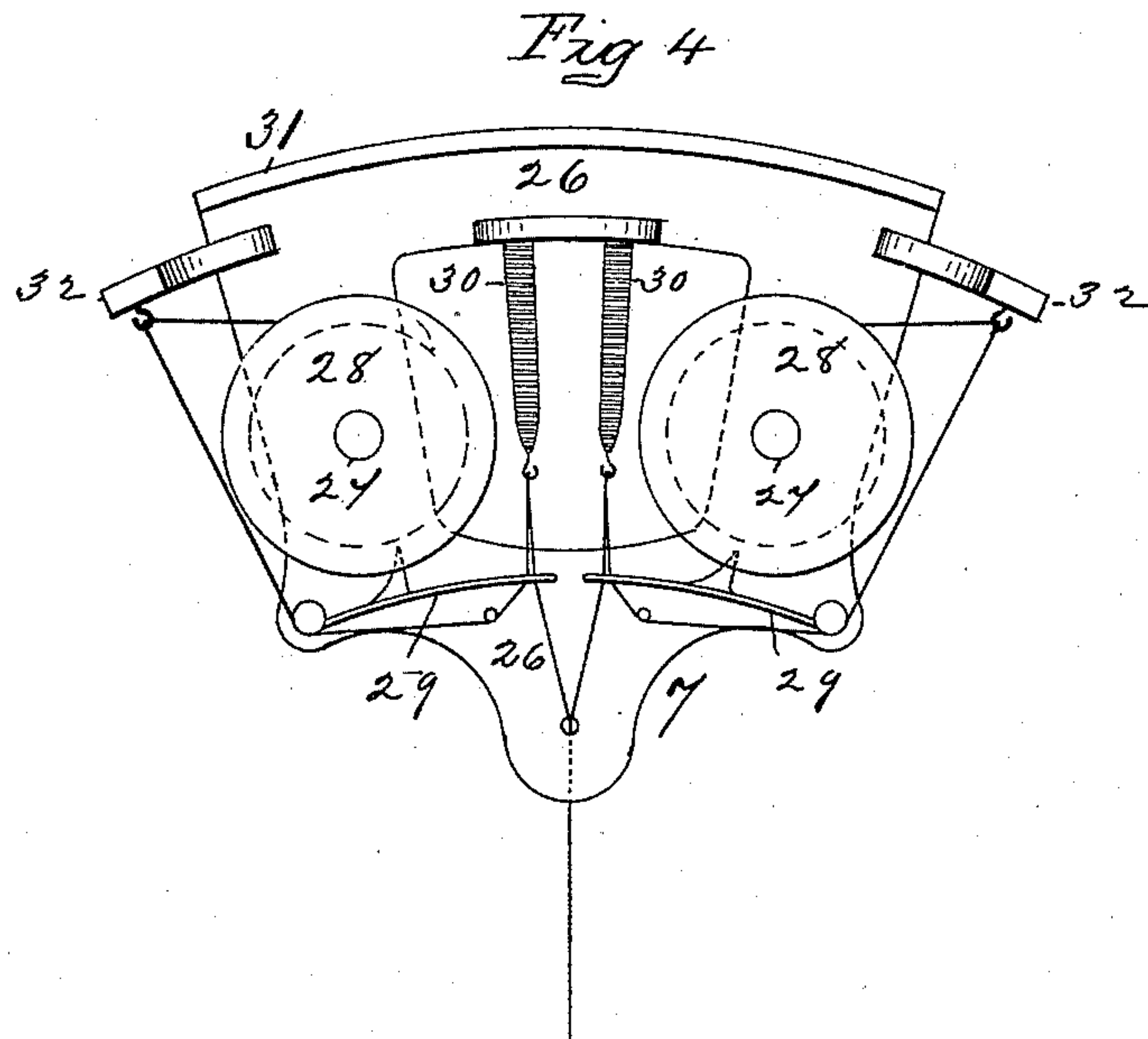
(No Model.)

2 Sheets—Sheet 2.

D. D. GRIFFIN.  
BRAIDING MACHINE.

No. 417,172.

Patented Dec. 10, 1889.



Witnesses  
Wm H Chapin  
G. M. Chamberlain.

Inventor  
D. D. Griffin  
By Chapin & Co  
Attys



# UNITED STATES PATENT OFFICE.

DUANE D. GRIFFIN, OF WESTFIELD, MASSACHUSETTS.

## BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 417,172, dated December 10, 1889.

Application filed January 10, 1887. Serial No. 223,855. (No model.)

*To all whom it may concern:*

Be it known that I, DUANE D. GRIFFIN, a citizen of the United States, residing at Westfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Braiding-Machines, of which the following is a specification.

This invention relates to braiding-machines; and the invention consists in certain details of improved construction of various parts thereof, all as hereinafter fully described, and pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a plan view of a braiding-machine embodying my improvements, parts being shown in section. Fig. 2 is a transverse section of the bed of the machine and the shuttle and bobbin carriers, and in which is also shown portions of the driving mechanism, one of the vibrating thread-arms, the central ring and parts of its supporting-arms, and a section of the cam-ring. Fig. 3 is an elevation of the inside of a portion of the cam-ring separate from the machine. Fig. 4 is a plan view of one of the shuttles of the machine. Fig. 5 is an end elevation (looking from the center of the machine) of a shuttle, the threadspools being removed from it.

In the drawings, 2 is the circular base-plate of the machine. 3 is the cam-ring thereof, consisting of several sections *a a a*, as shown in Fig. 3, which are secured around the border of the base-plate 2 in the position shown in Fig. 2. Said cam-ring is provided with a cam-groove 4 therein, in which one arm of the vibrating thread-guide 5 engages, and whereby it is given its properly-timed movements to raise and lower the bobbin-thread 6, (see Fig. 1,) to carry the latter over and under the shuttles as the latter are moved in their circular path, as below described, said shuttles being indicated by 7 and the bobbins by 8. Said base-plate is in the form of a flat ring.

The bobbin-carrier 9 consists of a flat ring arranged within the said cam-ring and having its upper surface substantially in the same plane as the upper edge of said ring, and the lower edge of the border of said bobbin-carrier has formed thereon a circular rack 10, with which a gear engages, as below described, to give it a rotary motion in a horizontal plane.

Said bobbin-carrier 9 rests on said base-plate 2. A shuttle-carrier 12, consisting, likewise, of a circular plate or flat ring, has a bearing also on the base-plate 2; but its periphery is separated from the inner border of the bobbin-carrier 9 by a groove 13, and the inner border of said shuttle-carrier overhangs the inner border of the base-plate 2, and has formed thereon a circular rack 14, with which a driving-gear engages, as below described. The outer border of said bobbin-carrier overhangs the periphery of the base-plate 2, as does the inner border of said shuttle-carrier the inner border of the base-plate, as aforesaid, said two carriers having thereby such an engagement with the outer and inner borders of said base-plate as compels them to rotate in concentric circles, and their upper surfaces are both arranged in the same plane. The bobbin and the shuttle carriers run in concentric circles, so that both sets of threads shall radiate from a common center. The carriers run in the same plane, so that the lifting and dropping of the thread when the carriers pass each other shall not be excessive, and by this construction a more even tension is maintained than would be the case if the carriers ran in separate planes and the threads had to be lifted to a greater extent.

A series of segmental shuttle-guides 15 is secured on the upper face of the bobbin-carrier 9. Said shuttle-guides are shown in section in Fig. 2 and in plan view in Fig. 1, and their inner edges extend somewhat over said groove 13 between the edges of the bobbin-carrier and shuttle-carrier, and the under side of said segmental guides has a groove 16 therein concentric with its inner border and with said groove, the groove in said guides being shown in dotted lines in Fig. 1, and, as shown in said figure, a space is left between the ends of said guides 15, the center of which is about on a line with the bobbin-thread 6 when the latter is drawn toward the center of the machine. Only one of said bobbin-threads is illustrated in operative position extending from the corner of the bobbin-plate 17 to the center of the machine, as aforesaid; but in practice when the machine is being operated a like thread is drawn from each bobbin 8, passing through an eye or suitable



hook in the end of the thread-guide 5 and between the ends of said shuttle-guides, as aforesaid. The said thread-guides 5 are bent in the form shown, whereby one end engages 5 with the aforesaid cam-groove 4 in the ring 3 and the opposite end in which is said thread-guiding eye is turned downward, as shown in Fig. 2, between the ends of the shuttle-guides 15, said eyed end reaching close to 10 the surface of the shuttle-carrier 12 in order to hold the bobbin-thread 6 in such position that the shuttles 7 can easily pass over it in their rotary movement on said carrier. Said thread-guides are hung in the boxes or bearings 18, in which they have said vibratory 15 motion, said boxes being secured on the face of the bobbin-carrier 9, and the arm of the thread-guide, which engages in the cam-groove 4, extends between the edge of said bobbin-carrier and the inner side of the cam-ring 3, as shown in Fig. 1.

The bobbins 8, on which the thread 6 is wound, rotate on a pin projecting upwardly from the bobbin-plate 17, and they have metallic heads, preferably, the lower one of which 25 is provided with the ratchet-teeth  $x'$ , as shown in Fig. 1. The bobbin-plate 17 is suitably secured to the face of the bobbin-carrier 9 and has on its opposite corners thread-guiding hooks 19 and a guide-pin 20, around which the thread 6 is drawn, as shown. A stop-arm 21, consisting of a piece of suitable spring-wire or strip of metal plate, is secured by one 30 end to the bobbin-plate 17 and has thereon a stop 22, which engages with said ratchet-teeth on the lower head of the bobbin 8. The arm 21 is so set and adjusted that it holds said stop normally in engagement with the head of the bobbin, and a hole is provided 40 through it near its free end, through which the thread 6 is passed, as shown. A spiral tension-spring 23, secured by one end to one corner of the bobbin-plate 17, has a hook on its opposite end, as shown.

45 The above-described stop-arm 21 and the spring 23 constitute the devices connected with the bobbin 8, which govern the tension of the thread and the delivery of the latter from the bobbin to the center of the machine, 50 where the converging threads from all of the bobbins are gathered and applied to the article upon which the braiding is to be done, and the operation of said device is as follows: The thread from the bobbin is led around 55 one of said thread-hooks 19, nearest to it, thence around the post which constitutes the fastening of one end of the arm 21 to the bobbin-plate, thence around said pin 20, thence through the end of the stop-arm 21 60 and through the hook of the spring 23, and from thence the thread is returned through said arm and around the hook 19, which is set a little beyond the border of the machine, and thence through the eye in the end of the 65 thread-guide 5, and thence under the ring 24, which is located over the inner ends of the shuttles 7, and is supported in that position

by arms 25, portions of which are shown in Fig. 2, which arms are secured rigidly to the outer border of the machine. The position of 70 the stop-arm 21 and spring 23 in which they are shown in Fig. 1 on the bobbin and plate on which the thread 6 is shown in connection with those parts is that which they occupy when at rest, or, in other words, when no ten- 75 sion is exerted on the thread, and whereby the bobbin is so held that it cannot rotate by reason of any motion which the parts of the machine may have contiguous to it; but when 80 by the braiding action of the machine the thread 6 is drawn toward the center of the machine the spring 23 becomes elongated and its end is drawn against the side of the stop-arm 21, thereby swinging it in the di- 85 rection that the thread is drawn, and carrying the stop 22 out of engagement with the ratchet-teeth of the bobbin, thereby leaving the bobbin free to turn by the tension of the thread, delivering the requisite quantity of 90 the latter therefrom; but as soon as the thread required has been drawn from the bobbin said tension becomes so reduced that the spring 23 is allowed to contract, leaving the arm 21 free to spring back toward the bob- 95 bin and re-engage the stop with the head thereof. If it be desired, as it may be in some classes of braiding-work, to run two bobbins in the place of one, as shown in Fig. 1, the bobbin 8 and its plate 17 and said ten- 100 sion devices may be duplicated.

The above-referred-to duplicate bobbin construction is illustrated in the construc- 105 tion of the shuttles 7, which occupy the position shown on the shuttle-carrier 12. Said shuttles consist of a plate 26, on which are two pins 27, on which the two-thread-bobbins 28 are placed, and for each of said bobbins is provided a stop-lever 29 and tension-spring 30, which springs and stop-levers are con- 110 structed and applied to the shuttle and operate to control the delivery of the thread and its tension, substantially in the same manner as that described above relative to the operation of those parts on the bobbin-plate 17. 115

In Fig. 1 one of the shuttles 7 is shown "threaded up," as it is termed, and the two threads from the two spools 28 thereon are led through the nose of the shuttle toward the center of the machine, as shown in Figs. 1 120 and 4. The rear edge of the shuttle-plate 26 has an upwardly-projecting rib 31 thereon, which engages in the above-referred-to groove 16 in the under side of the shuttle-guides 15, whereby the shuttles are maintained in a 125 proper relation to each other and to the center of the machine while they are being carried around on the shuttle-carrier 12, the nose or inner end of each shuttle extending some- 130 what beyond the inner border of the shuttle-carrier, and projecting sufficiently under the ring 24 to cause the shuttles to be by the latter held down or retained in a horizontal position while they are being operated, thereby



preventing the shuttles from being lifted from the carrier by the tension of the threads passing through the nose of the shuttles, as shown. Arms 32 project laterally from the opposite sides of the shuttle, to which a thread-hook is attached, as shown, and the under edges of said arms are suitably curved to facilitate the passage of the bobbin-threads 6 beneath the shuttles as the latter run over them. As means for such engagement of the shuttles with the shuttle-carrier 12 as is requisite to cause the shuttles to move with the carrier, a stud *n* of spherical form projecting slightly above the carrier is located at the side of each shuttle. Said stud, owing to its form, presents no obstacle to the passage of the bobbin-thread under the shuttle. Said ring 24 also serves to guide all the threads in the same plane.

The above-referred-to means for imparting a rotary motion in reverse directions to the shuttle-carrier and the bobbin-carrier, whereby the usual braiding effect is produced as the bobbin-threads are carried alternately over and under the shuttles while all are revolving, consists in a driving-shaft 33, hung in proper bearings under the machine and connected with any suitable driving mechanism, having fixed thereon a beveled gear 34, which engages with the rack 10 on the bobbin-carrier 9, and has thereon, also, a pinion 35, which engages with a beveled gear 36, and the latter engages with the rack 14 on the inner border of the shuttle-carrier 12. The said gear 36 is fixed on the end of a shaft, which is hung in suitable bearings under the machine, the latter being provided with any suitable legs or supports, upon which it rests when standing on a bench or table in operative position.

While the machine is in operation the operative movements of the thread-guide 5 are so timed by the form of the cam-groove 4, with which one arm of said guide engages, that the bobbin-thread 6 is held alternately in the position shown in Fig. 1, downward, so that the shuttle may pass over it, and then it

is raised to permit the succeeding shuttle to pass under it, the several bobbins and shuttles having said co-operating action, as is usual in machines of this class.

I am aware that a weighted lever has been described as a detent in a let-off mechanism for looms.

What I claim as my invention is—

1. In a braiding-machine, the rotating bobbin-carrier, the fixed cam-ring having a cam-groove therein, the vibrating thread-guides hung on the bobbin-carrier and having one arm engaging the cam-ring and the other the bobbin-thread, combined with the shuttle-carrier, the upper surfaces of both the shuttle and the bobbin carrier being in substantially the same plane.

2. In a braiding-machine, and in combination with suitable driving mechanism, the shuttle-carrier 12 and the bobbin-carrier 9 thereof, having their outer surfaces on which the shuttles and bobbins are carried both in the same plane, whereby the operation of interweaving the threads is facilitated, substantially as set forth.

3. The combination, with the shuttle-carrier and the shuttles, of the plaiting-ring 24, fixed over and near the inner border of the shuttle-carrier, substantially as set forth.

4. The bobbin-carrier and the shuttle-carrier, the upper operating-surfaces of both of which lie in the same plane, whereby the interweaving of the threads is facilitated, the segmental shuttle-guides 15, having grooves in the under side thereof, secured around the inner border of the bobbin-carrier and near the groove between the latter and the shuttle-carrier, combined with the shuttles having ribs thereon engaging with the grooves in said segmental guides, and mechanism, substantially as set forth, for actuating the carriers.

DUANE D. GRIFFIN.

Witnesses:

G. M. CHAMBERLAIN,  
H. A. CHAPIN.