

No. 858,735.

PATENTED JULY 2, 1907.

J. LUNDGREN.
BRAIDING MACHINE.
APPLICATION FILED JUNE 15, 1904.

5 SHEETS—SHEET 1.

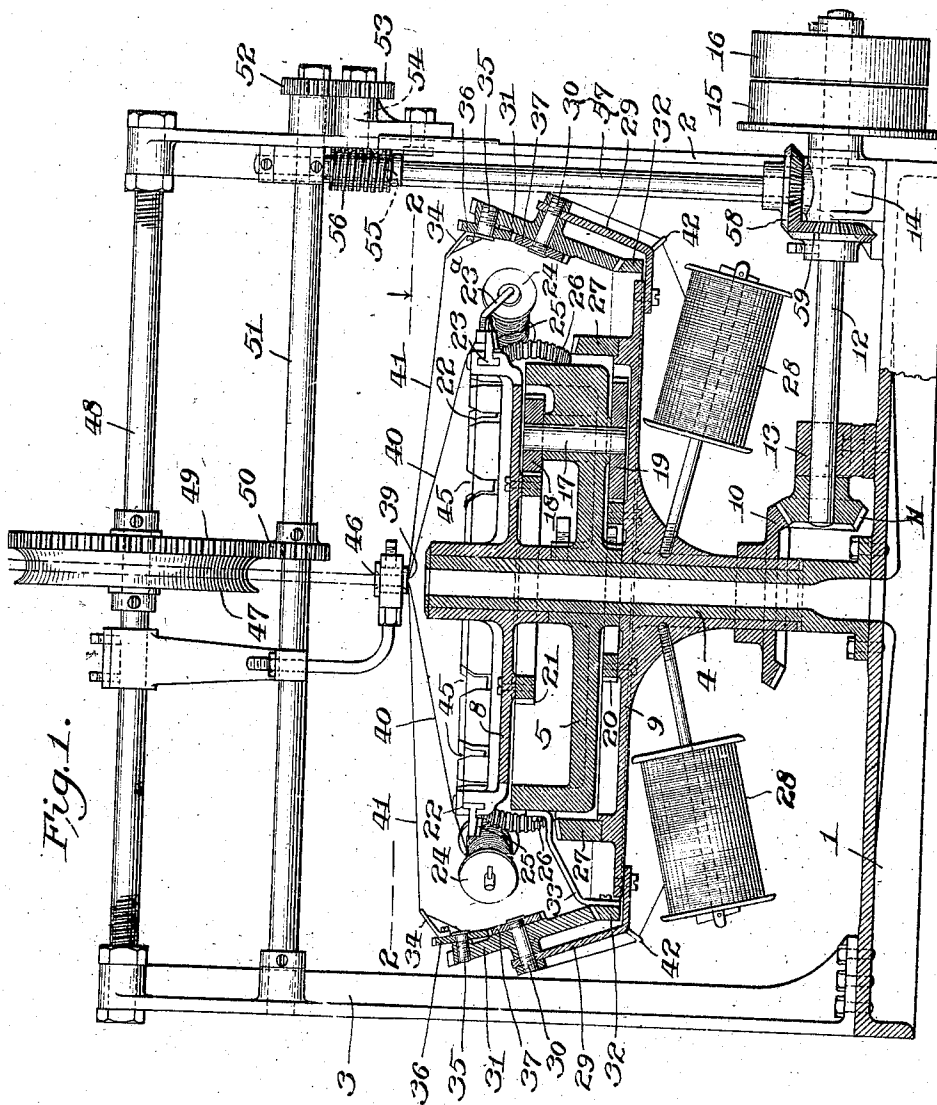


Fig. 1.

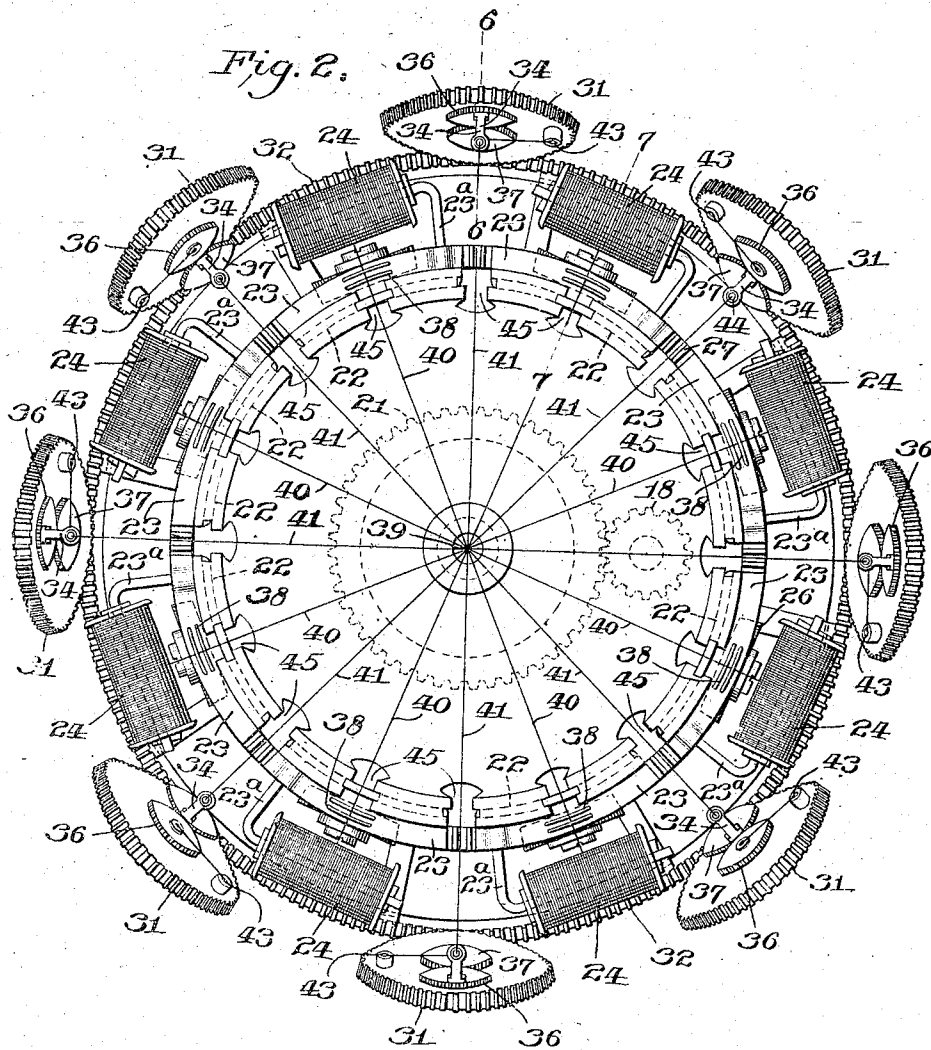
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5 SHEETS—SHEET 2.



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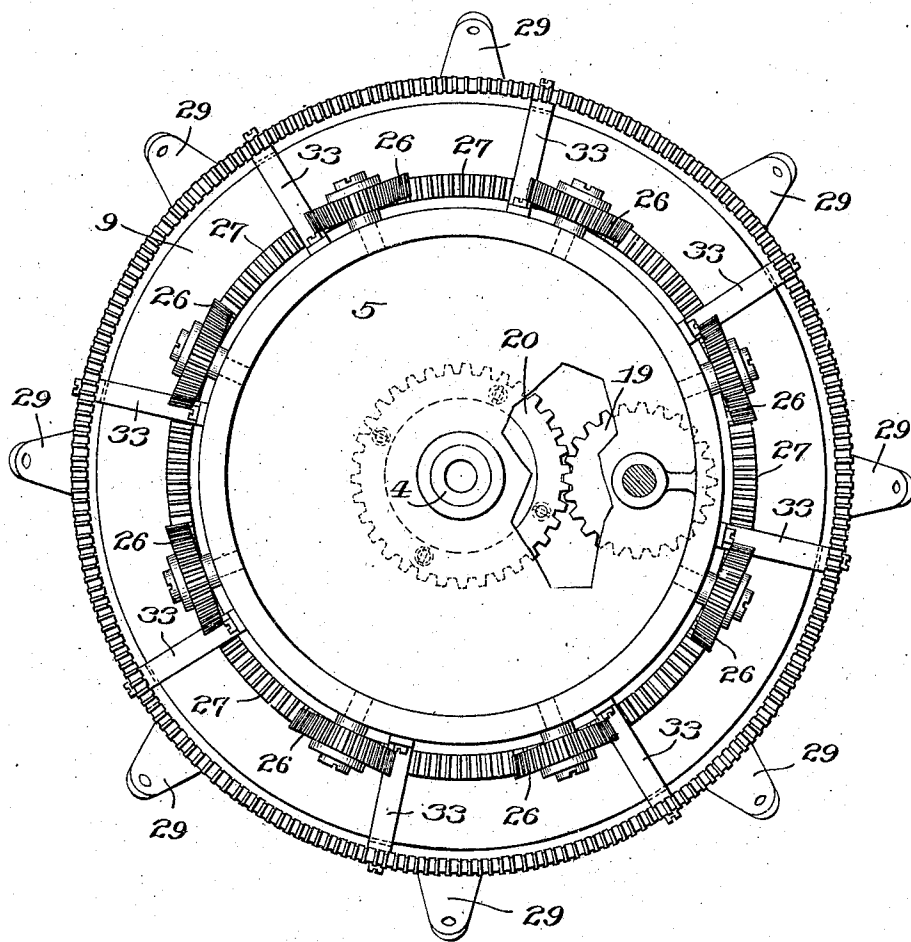
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5 SHEETS—SHEET 3.

Fig. 3.



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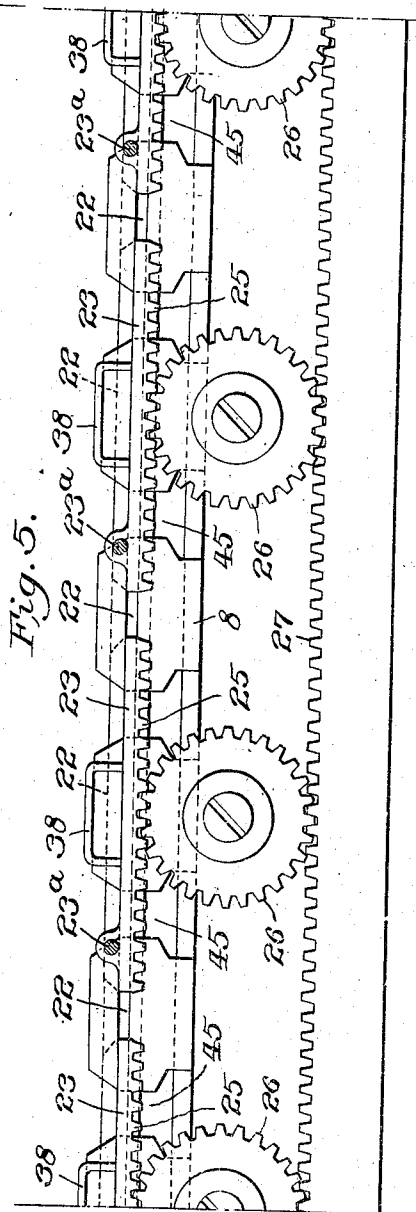
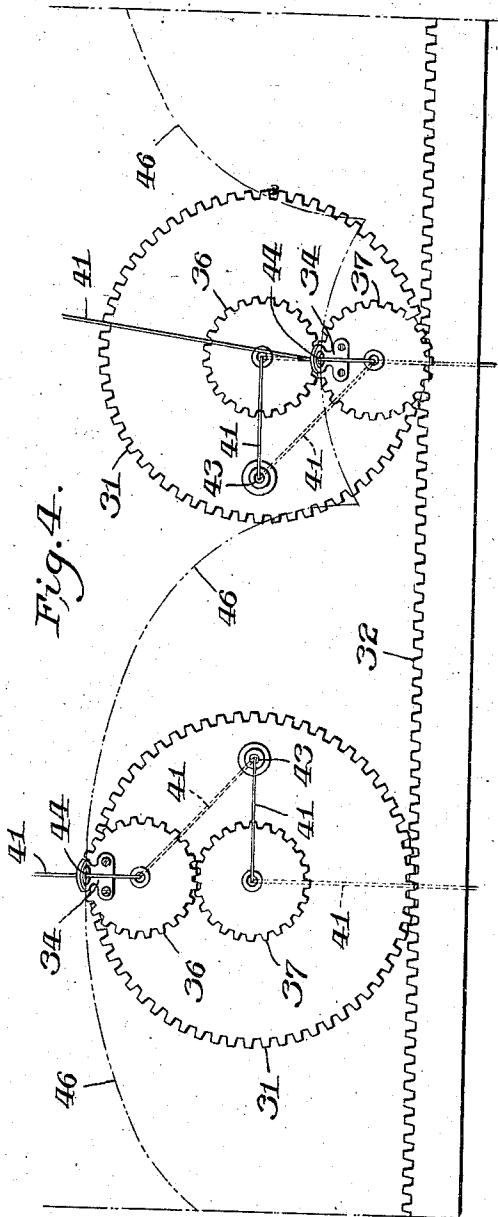
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5 SHEETS—SHEET 4.



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BRAIDING MACHINE.
APPLICATION FILED JUNE 16, 1904.

5 SHEETS—SHEET 5.

Fig. 7.

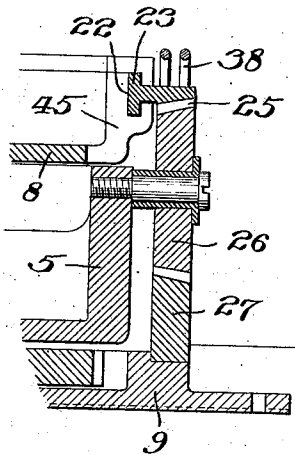


Fig. 6.

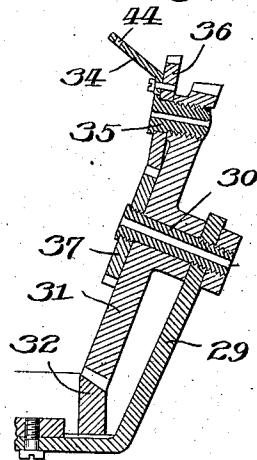
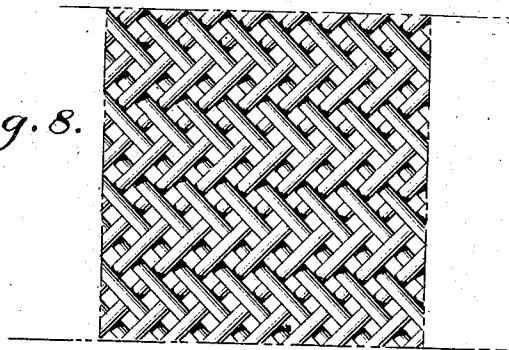


Fig. 8.



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UNITED STATES PATENT OFFICE.

JACOB LUNDGREN, OF PHILADELPHIA, PENNSYLVANIA.

BRAIDING-MACHINE.

No. 858,735.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed June 15, 1904. Serial No. 212,657.

To all whom it may concern:

Be it known that I, JACOB LUNDGREN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Braiding-Machines, of which the following is a specification.

This invention relates to that class of braiding machines wherein two sets of thread-supplying bobbins are rotated in concentric annular paths and in opposite directions to each other and wherein the threads delivered from one set of bobbins are directed under and over the bobbins of the other set and the threads delivered therefrom to effect the braiding operation. Heretofore, in machines of this class, the threads delivered from one set of bobbins were directed under and over the bobbins of the other set in alternate succession, thus producing a braided fabric wherein each thread extending in one direction passed in alternate succession over and under each thread extending in the other direction.

It has long been desired to produce, in a machine of the class to which my invention relates, a means whereby each thread delivered from one set of bobbins may be passed over and under each succeeding two bobbins of the other set in alternate succession and between each succeeding two bobbins which were passed over and under by each thread's preceding thread, thereby producing a braided fabric wherein each thread extending in one direction passed, in alternate succession, over and under each succeeding two threads extending in the reverse direction and between each succeeding two threads which were passed over and under by its two adjacent threads.

To accomplish this is the object of my present invention; and, with this object in view, the invention consists in the novel construction and combinations of parts which will be hereinafter fully described and claimed.

In the drawings Figure 1 is a central vertical section through my improved braiding machine. Fig. 2 is a plan view, as seen from below the line 2-2 of Fig. 1. Fig. 3 is a similar view having certain of the parts removed. Fig. 4 is a development showing several of the thread-guiding gear wheels, a portion of their actuating gear ring and, by dot-and-dash line, the path traversed by the threads delivered from one set of bobbins. Fig. 5 is a development of several of the bobbin carriers, their trackway, their actuating gear wheels and a portion of the gear ring for actuating the wheels. Fig. 6 is a sectional detail, as on the line 6-6 of Fig. 2. Fig. 7 is a similar detail, as on the line 7-7

of Fig. 2. Fig. 8 is a development of a portion of the fabric produced by the machine, enlarged.

The main frame of the machine comprises the bed plate 1 and the standards 2 and 3. Rising from the bed plate 1 is a centrally-arranged tubular post 4 which supports a fixed frame 5. Rotatably mounted on the post 4 above and below the fixed frame 5, respectively, are two frames or supports 8 and 9. The hub of the frame 9 is provided with a bevel gear wheel 10 in mesh with a similar wheel 11 on the inner end of the main driving shaft 12 which is journaled in bearings 13 and 14 on the bed plate 1 and is provided on its outer end with the usual driving pulley 15 and the adjacent loose pulley 16.

Journaled in the fixed frame 5 is a vertical shaft 17 which is provided on its upper and lower ends with a small and large gear wheel 18 and 19, respectively. The large gear wheel 19 is in mesh with a gear ring 20 fixed to the lower rotatable frame 9, and the small gear wheel 18 is in mesh with a gear ring 21 fixed to the upper rotatable frame 8; to the end that when the main shaft 12 is actuated to rotate the lower frame 9, the upper frame 8 will, through the gear wheels 19 and 18 and gear rings 20 and 21, be rotated in the same direction but at a slower rate of speed, due to the different diameters of said gear wheels and gear rings.

Formed on or secured to the upper frame 8 is a circular trackway 22, T-shaped in cross section, to which is fitted a series of similarly shaped carriers 23 each of which is provided with a projecting arm 23^a carrying one of a set of thread-supplying bobbins 24. Each carrier 23 projects outwardly beyond the trackway 22 and is provided on its under side with gear teeth 25 in mesh with a series of gear wheels 26 arranged around the fixed frame 5 and journaled on stud shafts projecting therefrom.

The lower frame 9 has affixed thereto a gear ring 27 which coacts with the series of gear wheels 26 in a manner to bodily rotate the series of carriers around the trackway 22 in a reverse direction to that of the lower frame 9, when power is applied to the driving shaft 12, the spaces between the carriers 23 and the gear wheels 26 being such that each carrier 23 is in engagement with one of the gear wheels at all times. The lower frame 9 carries a second set of thread-supplying bobbins 28 and also a series of upwardly extending brackets 29 corresponding in number with the bobbins 28. The brackets 29 are provided with centrally perforated studs 30 on which are journaled a series of rotatable members 31 which, in the present instance, are gear wheels adapted to coact with a fixed gear ring 32 supported by brackets 33 extending from

the fixed frame 5. The gear wheels 31 correspond in number with the bobbins 28 and they carry thread guides 34 which, are adapted to move toward and from the axes of rotation of said wheels during the operation of the machine. In the present instance this is accomplished by extending through each gear wheel 31, near its periphery, a centrally perforated stud 35 on which is mounted a freely rotatable gear wheel 36 carrying the thread guide 34. The gear wheel 36 is in mesh with a gear wheel 37 fixed on the inner end of the stud shaft 30, whereby when the gear wheel 31 is rotated upon the stud 30, the gear wheel 36 will be rotated upon the stud 35, the latter wheel making two complete revolutions for each revolution of the gear wheel 31.

The threads 40 delivered from the bobbins 24, pass under and over suitable tension wires 38 on the carriers 23 and then direct to the braiding point 39, and each thread 41 delivered from the bobbins 28 passes through guides 42 then through the stud 30, then through an opening 43 in the wheel 31, then through the stud 35 and finally through an eye 44 on the free end of the thread guide 34 projecting from the gear wheel 36. From the eye 44 each thread 41 passes to the braiding point 39.

As the lower frame 9 rotates, the gear wheels 31 are carried bodily thereby and, at the same time, the said gear wheels are individually rotated by their engagement with the fixed gear ring 32. This operation raises and lowers the gear wheels 36 and therewith the threads 41 in a manner to cause the latter to intersect the trackway 22 and the path traversed by the bobbins 24, the trackway being made in sections, as shown, and thus providing suitable openings 45 between adjacent sections into and out of which the threads 41 are adapted to pass as they are being raised and lowered. The arrangement of the openings 45 and the timing of the movement of the upper frame 8 and perforce the trackway 22 is such as to cause the proper register of the threads 41 with the openings 45.

The gear wheels 36 are so arranged on the gear wheel 31 that when one gear wheel 36 is in the highest position its two adjacent gear wheels 36 are in the lowest position and the converse. Thus when one half of the number of the threads 41 are being raised the other half thereof are being lowered.

When power is applied to the main shaft 12, the bobbins 28 move with the lower frame 9 in one direction and, through the mechanism hereinbefore described, the bobbins 24 are moved at the same rate of speed in the reverse direction. During this operation, each eye 44 is moved to guide its thread 41 through the path indicated by the dot-and-dash line 46 in Fig. 4, and the timing of this peculiar up and down movement of the threads 41 with relation to the movement of the bobbins 24 is such as to cause each thread 41 to pass over and under each succeeding two bobbins 24 and the threads 40 delivered therefrom, in alternate succession, and between each succeeding two bobbins 24 and the threads 40 delivered therefrom which were passed over and under by the preceding thread 41, thus effecting the braiding operation and the production of a braided fabric such as is illustrated in Fig. 8.

An important feature of my invention is the arrangement of the studs 30 and 35 each on lines which pass direct to the braiding point 39. This arrangement maintains the thread delivery eyes 44 at a constant distance from the braiding point 39 during the operation of the machine and obviates the otherwise necessity of take-up devices for the threads 41.

As rapidly as the braid is produced at the point 39 it is drawn up through the eye 46 by a suitable take-up wheel 47 which is loosely mounted on a horizontal shaft 48. The take-up wheel 47 is actuated by the main driving shaft 12 through the following mechanism:— Secured to the wheel 47 is a gear wheel 49 in mesh with a pinion 50 on a horizontal shaft 51. One end of this shaft 51 is provided with a gear wheel 52 which coacts with a similar wheel 53 on one end of a short shaft 54. The other end of the shaft 54 is provided with a worm wheel 55 which is driven by a worm 56 on the upper end of a vertical shaft 57. The lower end of this shaft 57 is provided with a bevel gear wheel 58 which is driven by a similar wheel 59 on the main driving shaft 12.

I desire it to be understood that I do not limit myself to the particular construction herein shown and described as the same may be greatly modified without departing from the invention.

I claim—

1. In a braiding machine, the combination of means for supporting and rotating two sets of thread supplying bobbins, in annular paths and in opposite directions to each other, and means for directing each thread delivered from one set of bobbins over and under each succeeding two bobbins of the other set in alternate succession and between each succeeding two bobbins which were passed over and under by each thread's preceding thread.

2. In a braiding machine, the combination of means for supporting and rotating a set of thread-supplying bobbins in an annular path, a set of independent carriers for a second set of thread supplying bobbins, means for supporting and rotating said carriers in an annular path and in a direction opposite to the movement of the first named bobbins, and means for directing each thread delivered from the first named set of bobbins over and under each succeeding two bobbins of the second named set of bobbins in alternate succession and between each succeeding two bobbins which were passed over and under by each thread's preceding thread.

3. In a braiding machine, the combination of means for supporting and rotating a set of thread-supplying bobbins in an annular path, a set of independent carriers for a second set of thread-supplying bobbins, a sectional annular trackway to which said carriers are fitted, means for rotating said carriers in a direction opposite to the movement of the first named bobbins, and means for directing each thread delivered from the first named set of bobbins over and under each succeeding two bobbins of the second named set of bobbins and between each succeeding two bobbins which were passed over and under by each thread's preceding thread.

4. In a braiding machine, the combination of means for supporting and rotating a set of thread-supplying bobbins in an annular path, a set of independent carriers for a second set of thread-supplying bobbins, a rotatable sectional annular trackway to which said carriers are fitted, means for supporting and rotating the trackway, means for rotating the carriers in a direction opposite to the movement of the first named bobbins, and means for directing each thread delivered from the first named set of bobbins over and under each succeeding two bobbins of the second named set of bobbins and between each succeeding two bobbins which were passed over and under by each thread's preceding thread.

5. In a braiding machine, the combination of means for

axes of rotation of said wheels, and means for supporting and rotating a second set of bobbins in a direction opposite to the direction of movement of the first named bobbins. 80

13. In a braiding machine, the combination of a support to carry a set of thread-supplying bobbins, means for rotating the same, gear wheels journaled on said support, a gear ring to rotate said wheels during the rotation of the support, thread guides rotatably mounted on said wheels and adapted to receive and guide the threads from said bobbins, means for independently rotating said guides during the rotation of said wheels, and means for supporting and rotating a second set of bobbins in a direction opposite to the direction of movement of the first named bobbins.

14. In a braiding machine, the combination of a support to carry a set of thread-supplying bobbins, means for rotating the same, perforated studs carried by said support, rotatable members journaled on said studs, means for independently rotating said members during the rotation of the support, thread guides carried by said members and adapted to receive and guide the threads from said bobbins, means for moving said guides toward and from the axes of rotation of said members, and means for supporting and rotating a second set of bobbins in a direction opposite to the direction of movement of the first named bobbins.

15. In a braiding machine, the combination of a support to carry a set of thread-supplying bobbins, means for rotating the same, perforated studs carried by said support, rotatable members journaled on said studs, means for independently rotating said members during the rotation of the support, thread guides rotatably mounted on said members and adapted to receive and guide the threads from said bobbins, means for independently rotating said guides during the rotation of said members, and means for supporting and rotating a second set of bobbins in a direction opposite to the direction of movement of the first named bobbins.

16. In a braiding machine, the combination of a support to carry a set of thread-supplying bobbins, means for rotating the same, perforated studs carried by said support, gear wheels journaled on said studs, a gear ring to rotate said gear wheels during the rotation of the support, thread guides carried by said wheels and adapted to receive and guide the threads from said bobbins, means for moving the threads toward and from the axes of rotation of said wheels, and means for supporting and rotating a second set of bobbins in a direction opposite to the movement of the first named bobbins.

17. In a braiding machine, the combination of a support to carry a set of thread-supplying bobbins, means for rotating the same, perforated studs carried by said support, gear wheels journaled on said studs, a gear ring to rotate said gear wheels during the rotation of the support, thread guides rotatably mounted on said gear wheels and adapted to receive and guide the threads from said bobbins, means for independently rotating said guides during the rotation of said wheels, and means for supporting and rotating a second set of bobbins in a direction opposite to the direction of movement of the first named bobbins.

18. In a braiding machine, the combination of a support to carry a set of thread-supplying bobbins, means for rotating the same, perforated studs carried by said support, rotatable members journaled on said studs, means for independently rotating said members during the rotation of the support, gear wheels fixed to said studs, gear wheels journaled on said members and in mesh with the first named gear wheels, thread guides carried by the second named gear wheels and adapted to receive and guide the threads from said bobbins, and means for supporting and rotating a second set of bobbins in a direction opposite to the direction of movement of the first named bobbins.

19. In a braiding machine, the combination of a support to carry a set of thread-supplying bobbins, means for rotating the same, perforated studs carried by said support, 155

port, rotatable members journaled on said studs, means
for independently rotating said members during the rota-
tion of the support, gear wheels fixed to said studs, per-
forated studs carried by said members, gear wheels jour-
naled on the last named studs and in mesh with the first
5 named gear wheels, thread guides carried by the second
named gear wheels and adapted to receive and guide the
threads from said bobbins, and means for supporting and
rotating a second set of bobbins in a direction opposite
10 to the direction of movement of the first named bobbins.

20. In a braiding machine, the combination of a rota-
table support to carry a set of thread-supplying bobbins,
a second rotatable support means for supporting and ro-
tating said supports in the same direction and at different

speeds, a sectional trackway on the second named support, 15
carriers fitted to said trackway to carry a second set of
thread-supplying bobbins, means for rotating said car-
riers in a direction opposite to the direction of movement
of the first named support, and means for guiding the
threads from the first named set of bobbins over and under 20
the bobbins of the other set.

In testimony whereof I affix my signature in presence
of two witnesses.

JACOB LUNDGREN.

Witnesses:

A. V. GROUPE,
RALPH H. GAMBLE.