

No. 695,746.

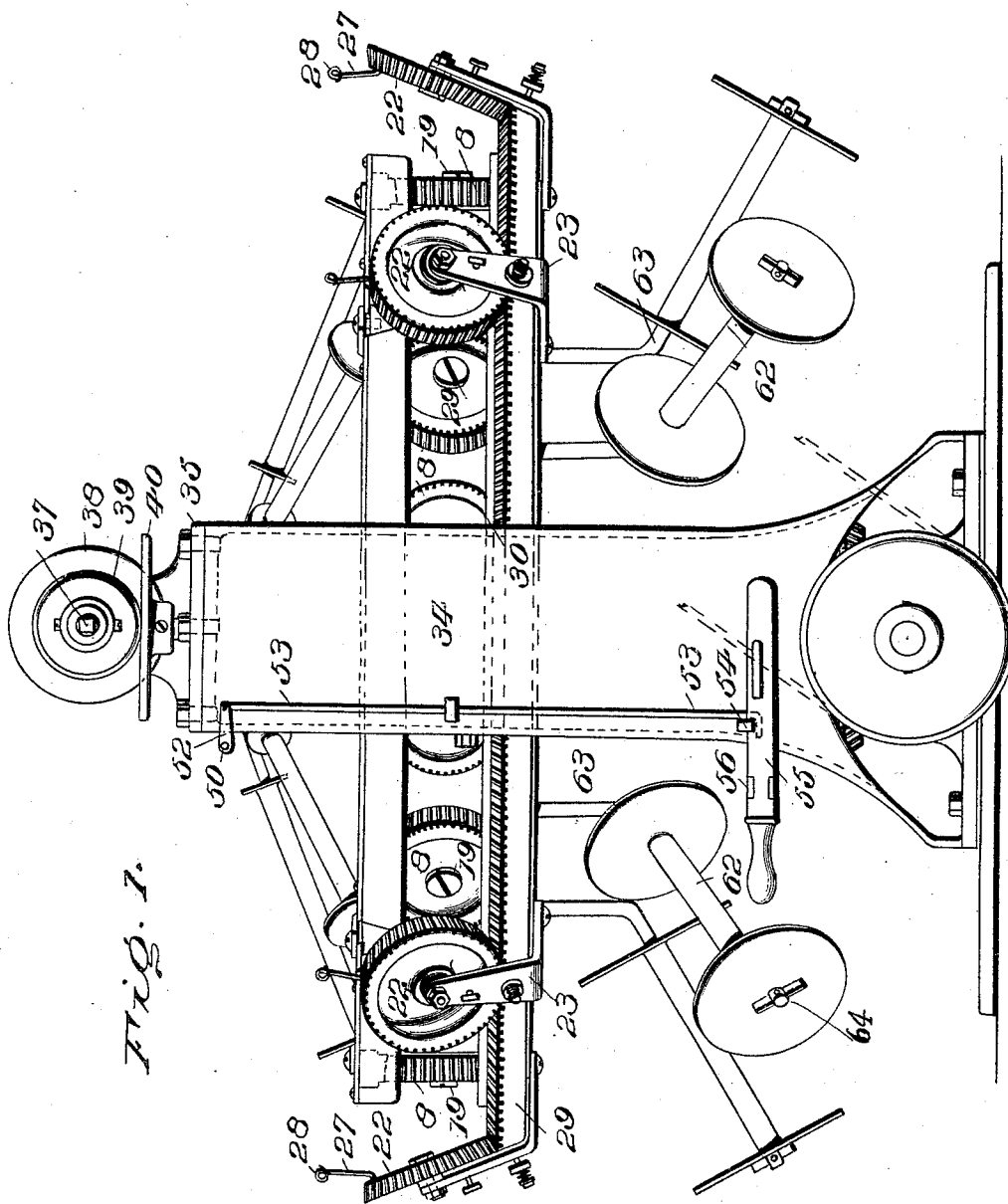
Patented Mar. 18, 1902.

J. LUNDGREN.
BRAIDING MACHINE.

(Application filed July 23, 1901.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses

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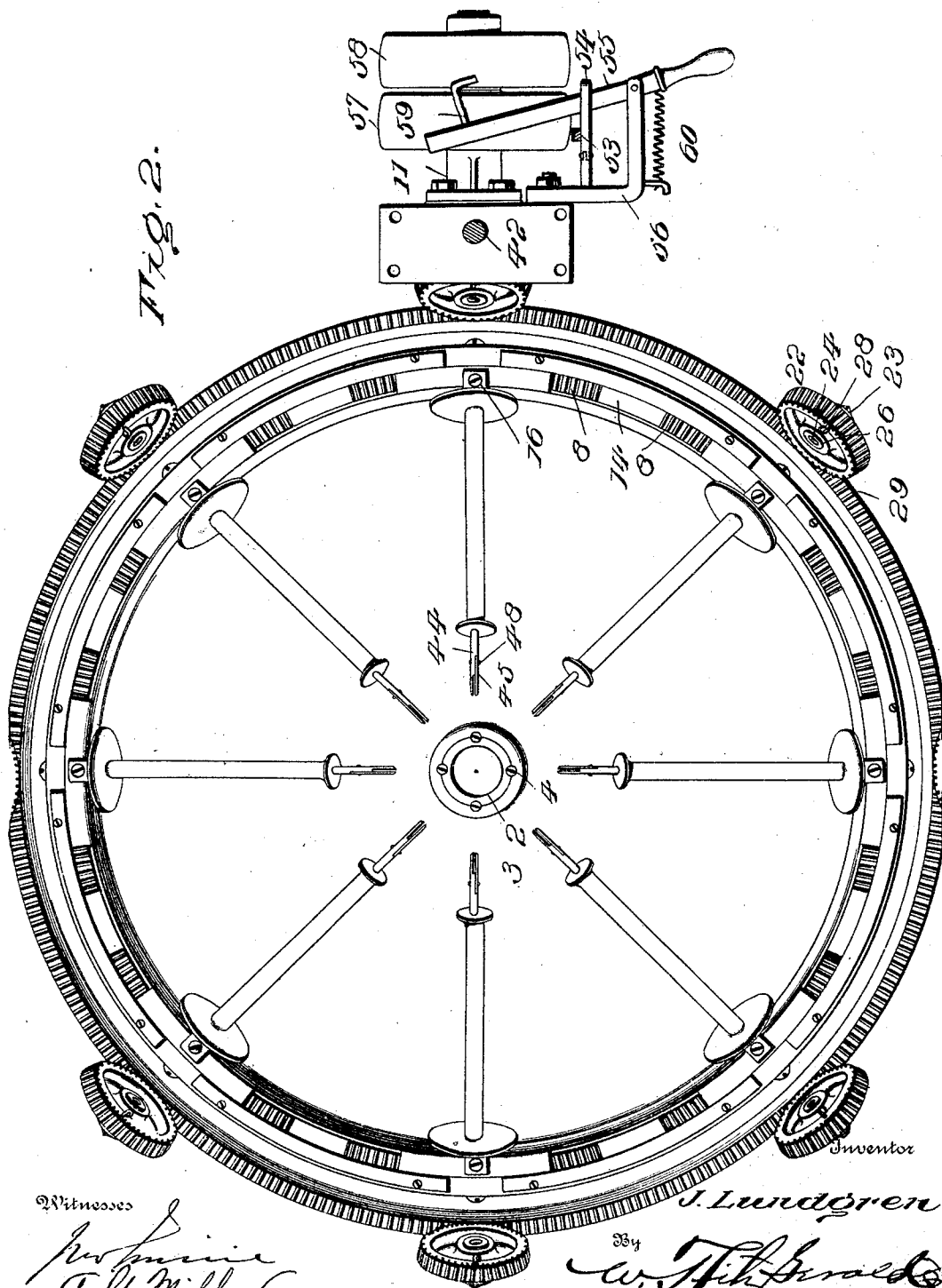
Patented Mar. 18, 1902.

J. LUNDGREN.
BRAIDING MACHINE.

(Application filed July 28, 1901.)

(No Model.)

4 Sheets—Sheet 2.



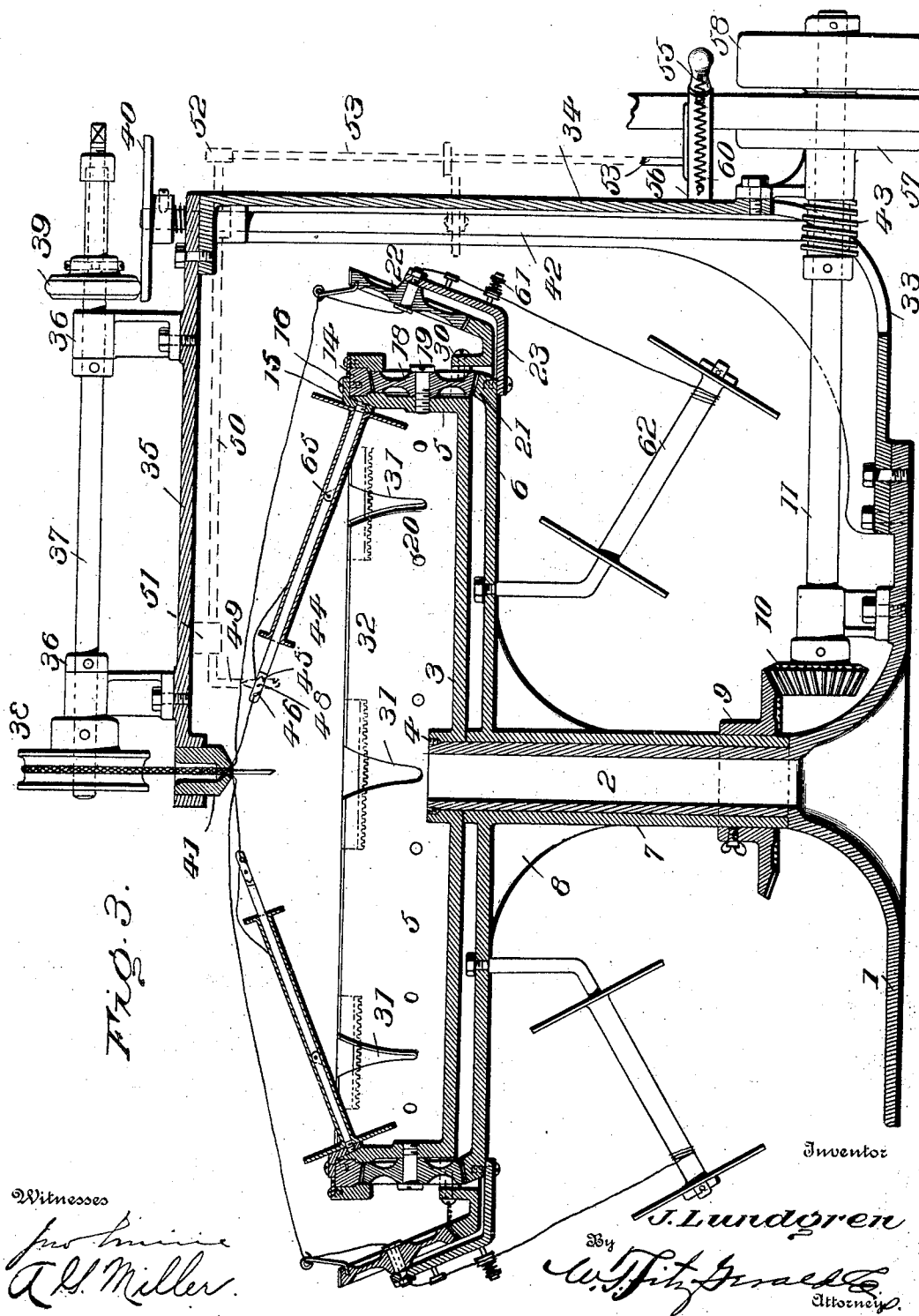
THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

J. LUNDGREN.
BRAIDING MACHINE.

(Application filed July 23, 1901.)

(No Model.)

4 Sheets—Sheet 3.

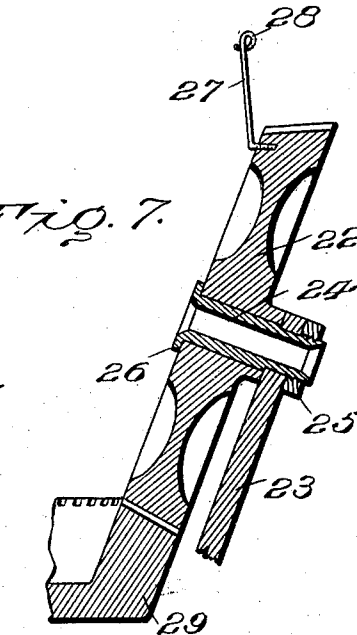
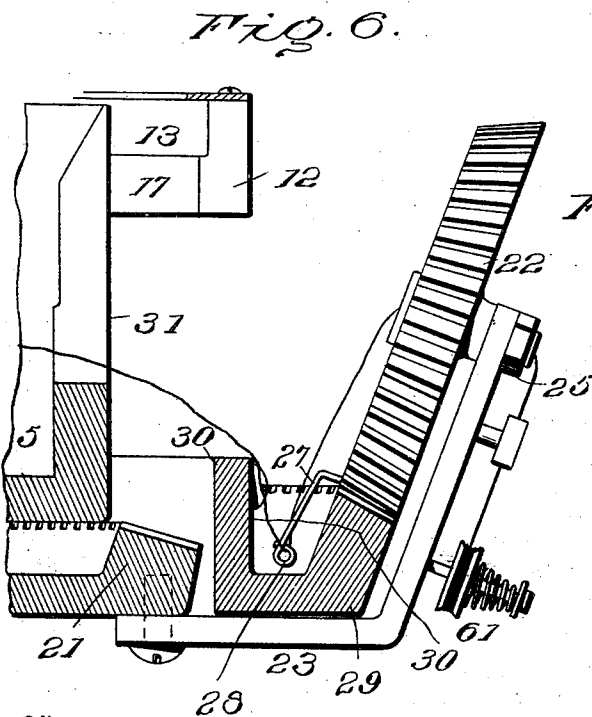
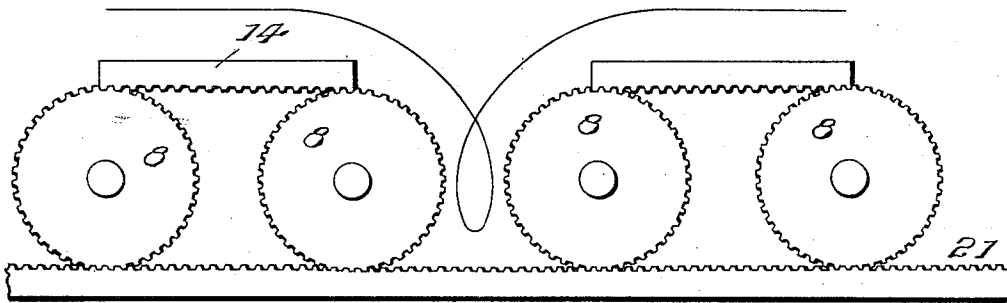
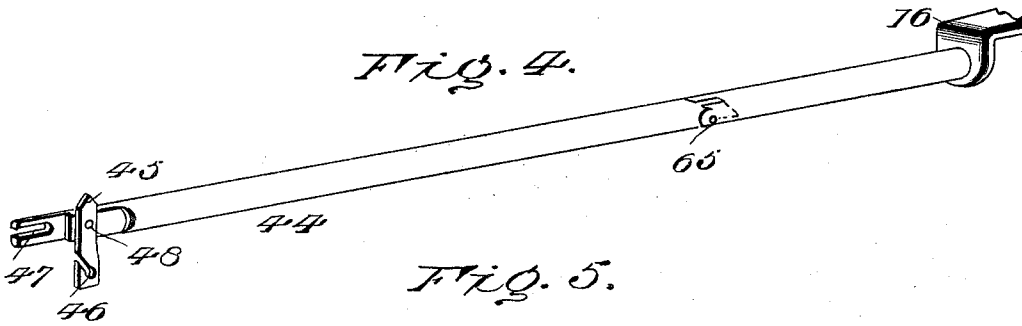


J. LUNDGREN.
BRAIDING MACHINE.

(Application filed July 23, 1901.)

(No Model.)

4 Sheets—Sheet 4.



Witnesses
per *James A. Miller*

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UNITED STATES PATENT OFFICE.

JACOB LUNDGREN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
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BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 695,746, dated March 18, 1902.

Application filed July 23, 1901. Serial No. 69,403. (No model.)

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; and I 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.

My present invention represents a further development in the art of constructing braiding-machines and comprehends certain new improvements of combination and construction of parts necessary to provide a completely-operative and reliably efficient machine adapted to form a covering of closely-incorporated threads for a central core of twine or other form of cordage, or said covering may as readily be disposed around a core or body of metal, as upon a wire, when it is desired to provide an insulated or other form of covering therefor.

My invention, as hereinafter described and claimed, is designed as an improvement not only in the general art as now developed, but is an outgrowth of and an improvement upon the construction presented by me in my application for Letters Patent for braiding-machines filed April 27, 1901, Serial No. 57,796.

The prime object of this invention is to eliminate all vibratory or reciprocating motion whereby the jar or pounding incident to the use of reciprocal movements will be entirely eliminated, and it is with the foregoing object in view that I have provided certain novel construction and combination of parts hereinafter set forth and claimed, it being understood that I desire to comprehend such equivalents and substitutes as fall fairly within the purview of the intent and purpose of my invention.

A further object, as set forth in my previous application, is to so simplify the details that the various parts of my invention may be very readily formed, as by the process of casting or molding, other objects and advantages not herein specifically enumerated being hereinafter made clearly apparent by reference to the following specification, consid-

ered in connection with the accompanying drawings, in which—

Figure 1 is an elevation of my invention complete. Fig. 2 is a top plan view of Fig. 1 on substantially the same scale, showing the upper part of the standard or inwardly-directed arm removed. Fig. 3 is a central vertical section of my machine complete, taken on the median line of the standard and arm. Fig. 4 is a perspective detail view of the preferred form of bobbin spindle or support designed especially for the upper bobbin. Fig. 5 shows an edge view of the inner trackway and an elevation of the gears designed to cooperate therewith and also showing said gears in coöperative relation with the spindle-carrying members or segments for the upper bobbins. Fig. 6 is a detail view, on a slightly-enlarged scale from that employed in the other views, illustrating a portion of the outer or inner trackways and the thread-directing member employed to coöperate with the threads in the lower bobbins. Fig. 7 is a central section of said thread-directing member presented in Fig. 7.

Those familiar with the art will readily understand that it has heretofore been common to provide an upper and a lower series of bobbins having coöperating devices adapted to direct the thread from the lower bobbins under and over each alternate bobbin of the upper series; but so far as I am aware said devices for directing the thread have utilized a reciprocatory motion for said devices, and since it is necessary to highly speed such a machine the pounding movement or jar resulting from the vibration renders such mechanism highly objectionable, as the life of the machine is necessarily very short, while the noise incident to the use of such machine is in itself highly objectionable.

For convenience the various parts of my invention and the coöperating elements required to properly present the materialization of my ideas will be designated by numerals, the same numeral referring to a corresponding part throughout the several views.

Referring to the numerals on the drawings, 1 indicates the base proper of my machine, which may be made in any preferred form or size deemed necessary and is preferably pro-

vided with an integral central extension or tubular post 2, to the upper end of which I rigidly secure the table or body portion proper, 3, of my machine, as by means of the set-screws or rivets 4 or other preferred means. The said table is circular in general outline and is provided upon its outer edge with the integral vertically-disposed flange 5, which extends upward a proper distance to provide a seat for certain cooperating parts, as will be hereinafter set forth.

Disposed immediately below the table-section 3 is the rotating member or spider 6, having the downwardly-extending tubular section or sleeve 7 and reinforcing-ribs 8, said tubular section being designed to snugly receive a contiguous part of the post 2, upon which it is designed to freely rotate, movement being imparted to said sleeve by means of the gear 9, keyed rigidly to the lower end and meshing with the driving-gear 10 upon the driving-shaft 11, the latter being mounted in suitable bearings, as clearly set forth.

A suitable trackway is provided in any preferred manner upon or adjacent to the upper edge of the vertical extension 5, as by forming an extension 12 integral therewith, said extension being directed outwardly and upwardly in order to provide the seat 13, in which are disposed a plurality of segmental rack-bars or spindle-carriers 14, the number thereof corresponding to the number of spindles, each segment being designed to carry its individual spindle, each spindle being preferably provided with an angular extension or bracket 15, adapted to be connected directly to the upper side of its respective segment, as by a set-screw 16 or otherwise.

At proper intervals throughout the entire seat 13 I cut away a section of the bottom thereof, as indicated by the numeral 17, the cut-away section being designed to receive the peripheral edge or part of the gear 18, adapted to drive the said segments and insure that they will be moved in a continuous circle throughout the entire annular recess or seat 13. The driving-gears 18 are multiplied in number as desired in accordance with the size of the machine and the number of upper bobbins employed, it being obviously necessary that said gears shall be sufficiently numerous to provide that two of them shall be contemporaneously in mesh with the segmental rack-bars 14, the purpose of which will be hereinafter made more fully apparent.

Each of the gears 18 is rotatably mounted in position upon the outer side of the flange 5, as by the bolt or shaft 19, the threaded end whereof engages a threaded seat 20 in a contiguous part of said flange. The gears 18 are actuated by means of the radial trackway 21, which is properly formed with a series of cogs or teeth designed to mesh with said gear, and since each of the gears 18 extends upward through the floor of the seat 13 the upper edge of each gear will be disposed

in mesh with the teeth upon the under side of the segmental carriers 14, thereby insuring that motion will be imparted to said carriers, and thereby direct the movement of the spindles, insuring that all of said spindles will be simultaneously moved in the proper direction.

It now becomes necessary to provide means for directing the thread from each bobbin of the lower series under and over each alternate bobbin or thread of the upper series, and I therefore desire to call special attention to what I regard as the salient feature of this invention, wherein it will be observed that I have entirely avoided the usual vibratory movements employed for this purpose and have substituted therefor a simple though reliably efficient device, which makes it possible to eliminate the noise as well as the destructive results arising from the employment of reciprocal movement. I therefore wish to secure in this application not only the construction of the device employed by me for directing the lower thread as said device is herein illustrated, but all the varied forms of construction comprising a substitute and equivalent for such device.

As a preferred means for directing the thread from each lower bobbin I have provided the gear or its equivalent 22, which is held in its operative position by means of the bracket 23, the lower inwardly-directed end whereof is connected in any preferred way to a contiguous part of the under side of the edge of the spider 6. The gear 22 is provided with a central bore of sufficient diameter to receive the tubular shaft 24, as it is through the bore of said shaft that I direct the thread from the lower bobbin, it being understood that said tubular shaft upon which the gear 22 rotates may be secured in engagement with the bracket 23 in any desired manner, as by threading the end therein or by means of the nut 25, a suitable head 26 being formed upon the inner end of the shaft, whereby said gear will be reliably held to the performance of its office. Upon the inner edge of the wheel thus or otherwise mounted in its operative position I provide the thread-directing arm 27, said arm being provided with the usual loop or terminal 28, whereby the thread will be engaged and paid off as desired, incident to the use thereof.

In order that the gear 22 may be actuated, I provide the stationary track-section 29, which is formed with the integral extension or flange 30, adapted to be connected at proper intervals to the outer surface of the flange 5, as by providing at said point of connection a suitable lug or extension upon the surface of said flange or by other preferred means. By this arrangement it is obvious that the said track-section 29 remains stationary with the flange 5, and since the spider or section 6 is rotated it will carry with it, by means of the bracket 23, the gear 22, causing said gear to rotate, and the movement thereof is so

timed that the thread-directing arm 27 will move down at the proper instant to pass the thread under the approaching bobbin, it being understood that a plurality of recesses 31 are provided in the upper edge of the flange 5, thereby insuring that the thread will be disposed below the upper bobbin and permit the bobbin to pass freely over the same.

I wish to lay particular stress on the importance of the disposition which I have made of the thread from the lower bobbins by extending the same through the tubular shaft 24, and thus disposing said thread in coöperative relationship with the arm 27, as it is by said combination or arrangement of parts that I have entirely eliminated all reciprocatory motion heretofore deemed necessary in this art. By reciprocatory movement in this instance I refer to that movement of a part wherein a momentary pause is a result, with the incident and consequent pounding, jar, or vibration, while by the use of the means I employ to control the thread from the lower bobbin the movement is continuous with the rotation of the gear 22, and it follows that I am not only able to accomplish the results hereinbefore set forth, but make it possible to drive the machine at a much higher speed with the resultant increase of the product.

Any desired degree of inclination may be imparted to the bobbin-spindles, according to the disposition of the bracket or member 16 with respect to the plane of the spindle carried thereby, it being understood that the inner face of the upper edge of the flange 5 may be beveled, as indicated by the numeral 32. In this instance I have designed my improved braiding-machine so that the parts thereof will be very compactly disposed, the machine thus constructed requiring but little space, making it possible to operate a large number of machines in a comparatively small room, one attendant being able to properly care for all of them.

As is common with machines of this class, the cord, wire, or other form of core is extended upward through the tubular post 2, while to one edge of the base-section 1 I connect in any preferred way the inward extension 33 of the standard 34, said standard at its upper end being provided with the inwardly-directed arm or bracket 35, formed integral with said standard or connected thereto, as shown. The arm 35 is designed to support suitable bearings 36 for the shaft 37, the inner end of which is provided with the grooved pulley 38, usually employed to engage the finished braid or cord, while the outer end of said shaft is provided with the adjustable friction-wheel 39, adapted to coöperate with the driving-disk 40, and it is obvious that by properly adjusting the wheel 39 with respect to the disk 40 any desired speed may be imparted to the shaft 37, thereby insuring that the finished cord will be drawn away with the proper degree of tension. The inner end of the arm 35 is provided with the cord or braid-re-

ceiver 41 common to all braiding-machines, it being understood that there may be a plurality of said receivers, each provided with an aperture corresponding in size with the braid or cord to be formed, as it is by this means that cords of varying diameters may be produced.

The actuating-disk 40 is connected to the upper end of the driving-shaft 42, the lower end of which carries a gear adapted to coöperate with the worm 43 upon the shaft 11, said shaft 11 being properly connected in any preferred way with the source of power.

It being very desirable and important that the machine may be quickly stopped in case a thread should become broken, I have provided upon the free end of each spindle 44 the pivoted member 45, having at one end the thread-engaging recess 46, said member when in its normal operative position being disposed parallel with the end of the spindle, as shown in Fig. 3, the thread in the bobbin being directed through the recess 46 and the recess 47 in the end of the spindle. If, however, a thread should become broken, the said member 45, being loosely pivoted upon the rivet or lug 48, will assume a substantially vertical position, as indicated by dotted lines in Fig. 3, and the upwardly-directed end of said member will thus be brought into engagement with the depending end or crank 49 of the shaft 50, said parts being indicated by dotted lines in Fig. 3.

It will be understood that the inner end of the shaft 50 is supported in any preferred way, as by the bracket 51, carried by the under side of the arm 35, while the outer end of said shaft passes loosely through a suitable aperture in the upper end of the standard 34 and is provided with the crank 52, the end of which is pivotally connected to the shaft 53. (More clearly shown in Fig. 1.) The lower end of the shaft 53 is connected to the pivoted hook 54, which latter is designed to engage a contiguous part of the belt-controlling lever 55, pivotally secured in position in the end of the bracket 56. The outer end of the shaft 11 is provided with the fixed pulley 57 and with the idler 58, while the lever 55 has at its inner end the belt-engaging hook or finger 59, said lever also being provided with the controlling-spring 60 of proper tension to insure that the belt may be reliably controlled and directed from the fixed pulley to the idler when a thread becomes broken. In order, therefore, to follow the operation of this part of my machine, it may be stated that when one of the threads of the upper series of bobbins becomes broken the member 45 upon that particular bobbin will assume the position indicated in Fig. 4 and by dotted lines in Fig. 3, thereby insuring that the said member will contact the depending crank end of the shaft 50 and will correspondingly elevate the end of the crank 52 and draw the rod 53 upward, forcing the hook member 54 out of engagement with the lever 55. When the le-

ver 55 is thus released, the force of the spring 60 will be brought to bear upon said lever, and thus move the belting from the fixed to the idler pulley, thereby stopping the machine. The same devices, cooperating with the lever 55, may be similarly actuated by suitable means adapted to cooperate with the shaft 53 when a thread from the lower bobbin is broken, and I deem it unnecessary for the purpose of this application to particularly set forth means for accomplishing this result.

It will be understood that any suitable form of tension device, as indicated by the numeral 61, may be provided for the thread from the lower bobbins 62, it being obvious that said bobbins are supported in any preferred way, as by the depending arms 63, the upper ends of which are secured in an aperture formed in the spider 6.

The lower ends of the depending arm 63 are provided with the pivoted member 64, so mounted in the slotted end of the arm 63 that it may be disposed parallel with the arm until the bobbin has been placed thereon, when it may be brought at right angles to the arm, thereby preventing the bobbin from casually slipping off.

By reference to Fig. 4 and other views it will be observed that each of the upper spindles is formed in two parts, said parts being connected together in such a manner that the upper end thereof may be freely elevated, but will not pass downward below the plane occupied by the inner section, said point of union being indicated by the numeral 65. This construction for the upper spindles is adopted in order that the bobbins may be readily slipped off of the same, as it would not otherwise be possible to remove the bobbins, owing to the close proximity of the braid-receiver 41.

It will be understood that the general design or arrangement of parts may be varied in order to more compactly or advantageously dispose the various elements, while in some instances it may also be desirable to so employ the rotating thread-directing member that it will direct the thread from the upper bobbins under and over each alternate lower bobbin, though it is thought that the disposition or arrangement of the parts herein presented will be found most desirable in practice.

Believing that the construction and combination of the parts deemed necessary in the materialization of my invention have been fully set forth, the operation thereof may be stated to be as follows: The power is applied to the shaft 11 in the manner stated, which, through the mediation of the gears 9 and 10, induces the rotation of the sleeve 7 upon the tubular post 2, thereby imparting a rotary movement to the spider 6, which carries with it the track 21 and the gears 22. The movement of the track 21 imparts a rotary movement to

the series of gears 8, which in turn actuate the spindle-carrying members or segmental sections 14, insuring that said sections will travel in their radial seats or tracks and that each will carry with it its respective bobbin.

By reference to Fig. 5 it will be seen that the spindle-carriers or segmental sections 14 are always in mesh with each segment and deliver the same to the next gear in such a manner that said gear and section will accurately cooperate with each other without hitch or jar. As the upper bobbins are all moved in one direction the gears 22 are so timed with respect to the movement of the next bobbin that the thread from the lower bobbin will be elevated in time to permit the next approaching bobbin to pass under, thereby manipulating said thread that it will be disposed under and over each alternate upper bobbin, the result being that the threads from the upper and lower bobbins will be so incorporated with each other at the braiding-angle and around the central core that said core will be completely covered by a woven fabric formed by said threads.

It is clear that various modifications may be adopted in the formation of the various parts without departing from the spirit and scope of my invention, inasmuch as, for instance, the gears 18 and 22 may be provided with frictional peripheral faces instead of cogs, in which case the trackways should be similarly formed, thus dispensing with cogs as a means of securing the rotation of said wheels, and it is for this reason that I have designated the gear 22 as a rotating member, desiring to comprehend all possible substitutes and equivalents thereof in this application.

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

1. In a machine of the character specified, the combination of a series of upper and lower bobbins and means to operatively mount said bobbins that each series will move in an opposite direction, of a rotating member and means to actuate the same whereby a thread from the lower bobbin will extend through said rotating member and be directed thereby under and over each alternate bobbin of the upper series, substantially as specified and for the purpose set forth.

2. In braiding-machines a suitable supporting-frame, a stationary table 3, a rotating spider 6, a continuous radial track-section for each of said parts combined with a series of upper bobbins carried by said table, a series of lower bobbins carried by said spider, a rotating member having a central bore adapted to receive a thread from the lower bobbins and means carried by said rotating member adapted to elevate and depress said thread whereby the thread will be so disposed that it will be directed under and over each alternate bobbin of the upper series and thereby insure that the threads from the upper and

lower bobbins will be thoroughly incorporated or plaited, all combined substantially as specified and for the purpose set forth.

3. In a machine of the character specified, 5 a suitable frame, a stationary table carried by said frame and having a radial flange upon its outer edge, a trackway carried by said flange, a plurality of segmental rack-bars, a plurality of gears carried by said flange and cooperating 10 with said rack-bars, an individual bobbin-spindle for each of said racks, in combination with a rotating disk or spider 6 having a radial rack-bar or track 21 adapted to cooperate with the gears carried by said flange, and a 15 plurality of rotating members 22 having means to receive the thread from the lower bobbins and permit the same to extend through the axial point thereof and additional means carried by said rotating member 20 to dispose the thread from the lower bobbin whereby it will be directed under and over each alternate upper bobbin as the latter are moved through their connection with said stationary member, all combined substantially 25 as specified and for the purpose set forth.

4. In a braiding-machine, a rotating thread-directing member 22, means to carry the thread through the central portion of said member and an arm 27 having means to engage said thread whereby it will be elevated and depressed during the travel of the rotating member all substantially as specified and for the purpose set forth.

5. In a braiding-machine having a stationary table provided with a flange 5, and also 35 having a rotating spider of a stationary track-section 29 connected to said table; a trackway or rack-bar 21 carried by said spider, a plurality of gears 18 carried by said flange and cooperating with said trackway 21, a guideway carried by said flange, a plurality of segmental rack-bars 14 having teeth adapted to cooperate with said gears each segmental rack-bar being adapted to carry a 40 bobbin-spindle, a plurality of lower bobbins carried by said spider and a plurality of rotating members 22 cooperating with said stationary track 29 said members having means to permit the extension of the thread from the lower bobbin through the axial point 45 thereof and additional means carried by said members adapted to elevate and depress said thread during the bodily travel of said rotating members whereby the thread will be directed downward in the recess 37 under an approaching carrier 14 and elevated out of 50 said recess in time for the next carrier to pass under the same, all operatively combined substantially as specified and for the purpose set forth.

6. In a machine of the character specified, the herein-described rotating member 22 having an axial bore and a thread-engaging arm 27 and suitable means to rotate said member 65 whereby the thread from the lower bobbin may be elevated and depressed for the purpose specified and as set forth.

7. In a braiding-machine, a thread-directing member comprising a wheel having a central bore; a tubular axle fitting said bore; an arm carried by said wheel and having a thread-engaging device whereby a thread may be extended through the true diametrical axis of the wheel into engagement with said arm and delivered without twisting, substantially as specified and for the purpose set forth.

8. In a braiding-machine a plurality of upper and lower bobbins, means to rotatably mount said bobbins in position and additional means to move each series in an opposite direction, combined with a rotating thread-directing member 22 having an axial aperture adapted to receive the thread from the lower bobbins, said rotating member also 85 having a thread-directing arm 27 adapted to engage the thread after it extends through said bore and elevate and depress the same during the travel of said member thereby permitting each alternate upper bobbin to travel under and over said thread all substantially as specified and for the purpose set forth.

9. In a braiding-machine, a suitable support having a tubular post, a table fixedly secured on said post and a rotating member 6 95 mounted thereon combined with a trackway carried by said table and a plurality of rotating members 18 mounted beneath said trackway; a plurality of spindle-carriers 14 disposed in said trackway and cooperating with said rotating members and means carried by said spider to actuate said members whereby they will successively engage each of said carriers and actuate the same, all substantially 105 as specified and for the purpose set forth.

10. In a braiding-machine a suitable support and a stationary table having a flange carried by said support, in combination with a rotating member or spider 6, a trackway 110 carried by said table, a plurality of spindle-carriers mounted on said trackway, suitable means to communicate motion from the rotating spider-section 6 to said carriers, and a rotating member 22 having a tubular bore 115 adapted to receive the thread from the lower bobbins and direct the same under and over each alternate upper bobbin and means carried by the stationary table to cause the rotation of said thread-directing member, all 120 combined substantially as specified and for the purpose set forth.

11. In a braiding-machine, a rotating thread-directing member comprising a wheel having a beveled edge and a plurality of teeth 125 upon said edge and also provided with a central bore in combination with a tubular axle adapted to fit said bore, and an arm attached to the inner face of said member and provided with a thread-engaging loop at the end 130 thereof all substantially as set forth.

12. In a braiding-machine, a rotating member 22 comprising a wheel having a toothed periphery, and an axial bore and further pro-

vided with a rigid arm having at its end a thread-engaging device, substantially as set forth.

13. In a braiding-machine, the combination with a stationary table 3 and a rotating spider 6 and an upper and lower series of bobbins therefor respectively, of suitable cooperating devices carried by said parts whereby said series of bobbins will be moved in an opposite direction and a rotating member carried by said spider and actuated by said table adapted to direct the thread from the lower bobbin under and over each alternate upper bobbin as set forth.
14. In a machine of the character specified, a bobbin-spindle formed of two parts and so hinged that the outer free end may be freely elevated but cannot pass below the plane occupied by the fixed part thereof substantially as specified and for the purpose set forth.
15. In a braiding-machine having a plu-

rality of upper bobbin-spindles, the combination of a thread-engaging hook pivoted to each spindle; a crank-shaft mounted upon the frame of the machine and having at its inner end a depending section while its opposite end is operatively connected with the driving-pulley whereby when said pivoted hook is released by a broken thread it will be directed upward by centrifugal force into engagement with said depending section and thereby partially rotate said shaft and operate to shift the driving-belt to an idler-pulley and stop the machine all combined substantially as specified and for the purpose set forth.

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

JACOB LUNDGREN.

Witnesses:

A. V. W. BUDD,
J. DANIEL EBY.