(No Model.) 2 Sheets—Sheet 1.

A. DE LASKI.

CIRCULAR LOOM.

No. 503,544. Patented Aug. 15, 1893.

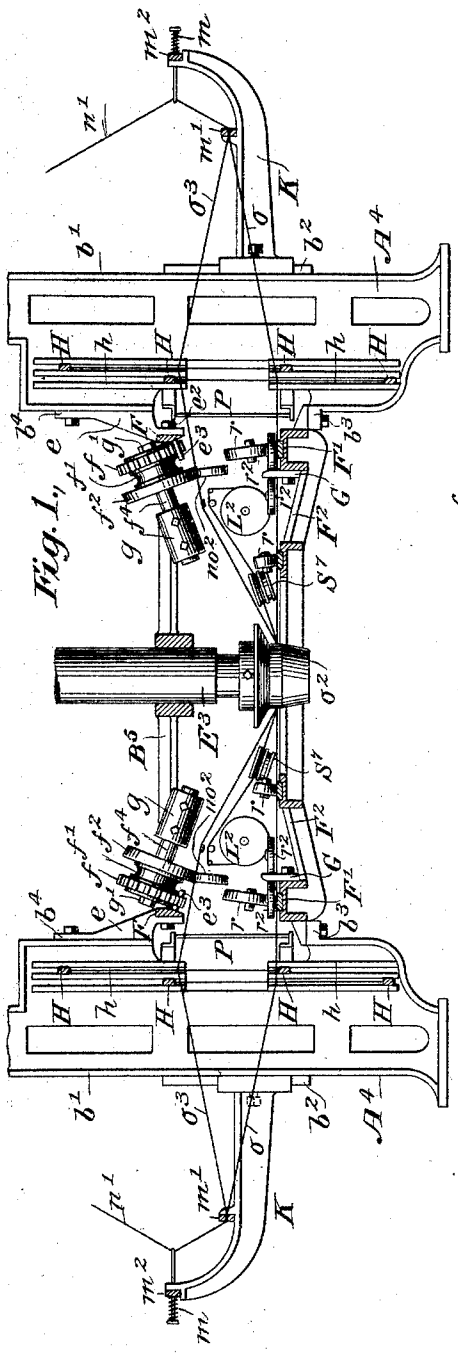

Fig. 1.

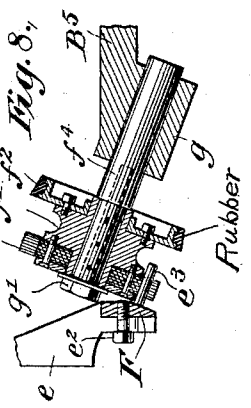

Fig. 8.

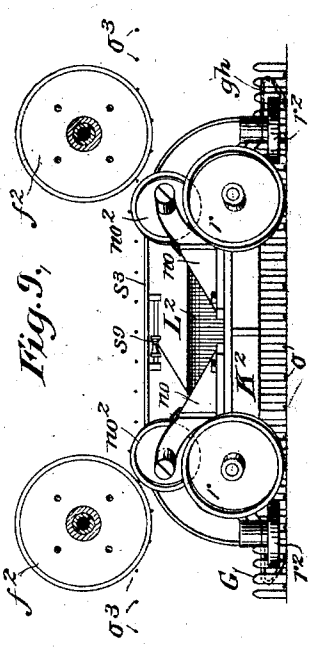

Fig. 9.

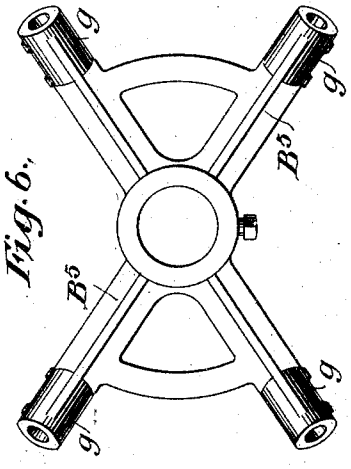

Fig. 6.

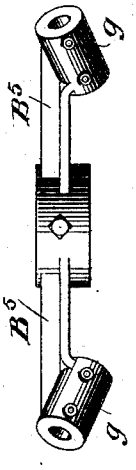

Fig. 7.

Witnesses
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(No Model.) 2 Sheets—Sheet 2.

A. DE LASKI.

CIRCULAR LOOM.

No. 503,544. Patented Aug. 15, 1893.

Fig. 2.

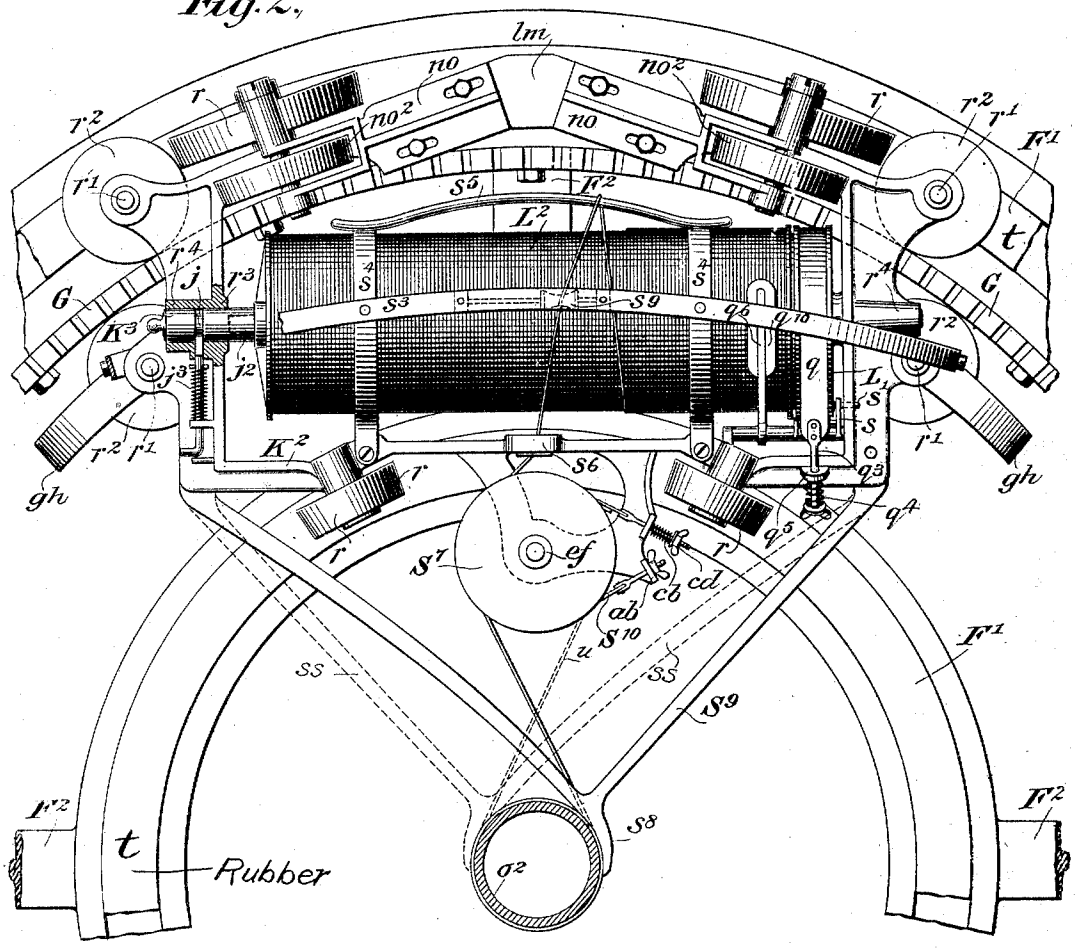


Fig. 3.

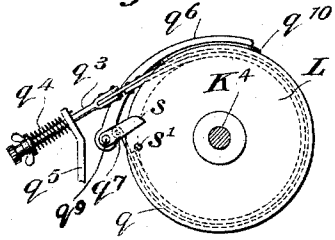


Fig. 4.

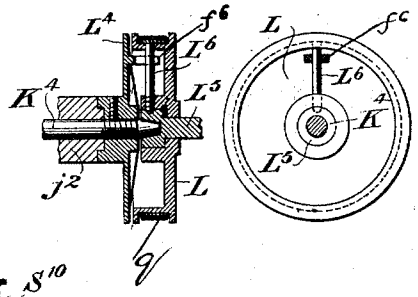
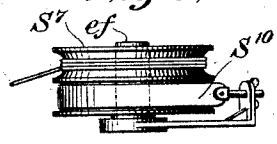


Fig. 5.



Witnesses
Geo. W. Breck.
Henry W. Lloyd.

Inventor
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UNITED STATES PATENT OFFICE.

ALBERT DE LASKI, OF CLEVELAND, OHIO.

CIRCULAR LOOM.

SPECIFICATION forming part of Letters Patent No. 503,544, dated August 15, 1893.

Application filed April 10, 1891. Serial No. 388,418. (No model.) Patented in England, March 11, 1892, No. 4,817.

To all whom it may concern:

Be it known that I, ALBERT DE LASKI, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Circular Looms, (for which I have obtained a patent in Great Britain, No. 4,817, dated March 11, 1892;) and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

My present invention relates to that portion of a circular loom which comprises the shuttle, or shuttles, thereof; the mechanism by means of which the shuttle, or shuttles, is, or are, driven; and other devices directly co-operative with said shuttle and shuttle-driving mechanism.

To enable those skilled in the art to fully understand and practice my invention, I will now proceed to more fully explain the several features thereof, and, to more explicitly describe, by reference to the accompanying drawings which form part of this specification, the construction and operation of a machine embracing my present invention.

In the drawings I have shown only so much of a circular loom, of a well known form (such, for instance, as seen in my patent of April 26, 1887, No. 361,994), and in public use as seems to be necessary to illustrate the novel structural features made the subject of this application.

In said drawings: Figure 1, is a partial vertical central section, of a circular loom embracing my invention; the upper and lower portions of the machine not being shown, in order to permit the drawing of the parts that are shown, on a larger scale. Fig. 2, is a partial horizontal section, on an enlarged scale, showing, in top view, the shuttle, the shuttle track, &c. Fig. 3 is a detail view showing one end of the bobbin and its brake-band device. Fig. 4, shows in detail views (one a central section and the other an inner face view), the bobbin head, and its dogging, or clutching, devices. Fig. 5, is a detail edge view of the bobbin tension devices, detached. Fig. 6, is a top view, of the radial arms for carrying and rotating the shuttle-driving devices. Fig. 7 is a side, or edge, view of the same. Fig. 8, is a detail sectional view, showing one of the frictional, shuttle-driving-wheels, with its supports, and the pin-gear with which it engages. Fig. 9, is a detail, or partial, side view, looking at the outer edge, or exterior, of the shuttle-track.

In all the views the same part will be found always designated by the same reference letter.

As is well understood, it is a great desideratum in the construction of a circular loom, to have the shuttles, together with the track, or race-way, on which they travel, and the mechanism for driving said shuttles (no matter whether there be a greater, or a less number thereof), all constructed and arranged to operate in such manner, that the highest possible, or practicable, rate of speed may be attained to, in the weaving operation, without danger of derangement of the parts, and without undue wear and tear thereon; also so that the shuttle, or shuttles, can easily have the bobbin, or bobbins, rapidly removed and replaced, in supplying the shuttle with fresh filling thread; and also so that the middle, or interior portion of the circular loom will be as free as possible, from gearing and other working parts, requiring lubrication, the oil from which is liable to drop upon, or otherwise soil, the product which is taken off, by some suitable means, from the weaving-pin of the loom. As is also well known, it is indispensably necessary, (among other things) to the successful and rapid working of a circular loom, to have the construction of the shuttle mechanism such that the thread, drawn off from the bobbin (always under high tension) will be subjected to a perfectly uniform tension, from the beginning to the end of the use of the contents of the entire bobbin. In my improved loom I have attained to the accomplishment of all these desirable ends, in an eminent degree, by the novel structural features and devices which will be found hereinafter fully explained, and which, so far as they form part of my present invention, will be found particularly pointed out in the claims of this specification.

F′, is the shuttle track, which is secured to the projecting seats b^3, from the posts A^4 as shown, and which has two rails connected by the arms F^2, each provided with a road-way of inlaid rubber, or other non-metallic and

yielding substance *t*, on which the truck-wheels *r* of the shuttle travel, in such manner, as to subject the lower threads of the warp shed to the least possible injurious friction and agitation; the outer track of said circular race-way being provided, at its inner edge, or perimeter, with a toothed, or comb-like, vertically arranged rim G, in the spaces between the teeth of which, the warp threads move, up and down, in the formation of the sheds, during the weaving operation. The inner rail of the circular shuttle-track is supported by only half the number of radially arranged arms, or pieces, F^2 of the frame work, that are employed to support the outer rail of the track; in order that more space may be left between the horizontal, radial, bars, and thus greatly facilitate, and in fact, thus permit the extrication of the bobbin, from the shuttle frame, downwardly, or from beneath the shuttle; whereby the operator can much more quickly and conveniently, take out the empty bobbin, and replace it by a full one; and can also, much more conveniently, and at a better place, effectuate the splicing of the tail end of the old filling thread, to the leading end of the thread of the new, or fresh, bobbin. By the arrangement of the comb-like vertical rim, or circular fence, G, at the inner perimeter of the outer rail of the shuttle-track, instead of at its outer perimeter, I am enabled to use a larger set of outer guide-wheels, on the shuttle frame, without having to place the guide-wires, or reeds P, of the loom, too far away from the shuttle; it being important to have these reeds, or guide-wires, located as near as possible to the outer portion of the shuttle itself.

The bobbin of the shuttle is provided with novel and simple devices, all as will be presently explained, by means of which it can be easily disengaged from, and re-engaged with, the shuttle frame proper, and the shuttle is also provided with a novel and efficient friction-brake mechanism, by means of which, as the thread on the bobbin is used up, the resistance to the rotation of the bobbin (caused by the pulling off of the thread), will remain about uniform until all the thread is used off the bobbin.

In lieu of a perforated lacing-bar and spring, or such other forms of tension devices, as have heretofore been used, on the filling thread, at a point intermediate of where it leaves the bobbin frame and passes on to the weaving-pin, I employ a rotatory tension device, composed of a grooved wheel, around the periphery of which the filling thread makes one, or more, turns (in its passage to the weaving pin), the said tension wheel having combined with it a sheave-like device, or wheel, on the periphery of which acts the automatic compensating hand-brake, in such manner, that, in drawing off the bobbin thread, during the weaving operation, the said thread irrespective of its conditions, or variations, as to size, quality, and twist, will always be subjected to a uniform tension, of a predetermined force, or degree. Furthermore, the character of my new tension device, or mechanism, is such, that after the operation of splicing the tail end of the old thread to the leading end of the thread of a fresh bobbin, (by the usual stranding and square-knot operation) no impediment whatever is offered to the passage around, and through, the tension devices, of that portion of the thread where the splicing knots occur; no matter whether the knotting and splicing shall have been very carefully, or very roughly and quickly, done.

The shuttle frame is provided with a spreader, or batten device, to be presently more fully described, which is both adjustable (to suit different sized weaving pins), and reversible, to permit the running of the shuttle, or shuttles, in either direction.

The shuttle-truck, or frame, is provided, at its lower end, with bevel-faced anti-friction wheels, located inside of, and partially above, the set of wheels which travel on the outer rail of the shuttle track; through the rotation of which anti-friction wheels the shuttle is driven around on its track, by the shuttle-driving mechanism of the loom. This shuttle-driving mechanism, which is entirely novel and constitutes an important feature of my invention, consists essentially in one, or more, friction wheels, arranged to travel bodily, (and also to rotate axially,) with the periphery, or peripheries, thereof in contact with one, or the other, of the anti-friction wheels of the shuttle, last above alluded to; said friction wheels being mounted to, turn freely, upon stationary spindles carried in the outer end, or ends, of an arm, or arms, mounted to rotate around the axis of the weaving pin, and being connected with a drive-pinion, or pinions, also mounted on said spindle, or spindles, and receiving motion from a stationary rim gear; all as I will now describe.

Mounted interiorly of the circular frame of the loom, preferably in a vertically adjustable manner, is a rim-gear e^3, which, in the case shown, is made in the form of a pin-gear, with the pins arranged obliquely, or on a bevel; and, in engagement with this, bevel, rim-gear work (one or) a series of slightly beveled pinions *f*, the hubs of which also carry the bevel faced friction drive-wheels f^2, that operate, or drive the shuttle. Preferably the said beveled pinion *f*, is composed of raw hide, or vulcanized fiber, while the working face, or periphery, of the said friction-wheel f^2, is composed of rubber compound, or some other soft and elastic material, which will run, with the least possible wear, over the warp threads; and, in operation, as the revoluble radial arm, or arms, gyrate, or travel rapidly round about, the axis of the main central shaft of the loom, the said beveled pinion (or pinions) rotates rapidly about the axis of the said protruding spindle of the radial arms (as the said pinion, or pinions, travel in engagement with the

teeth of the said rim-gear); and the said rapid rotation of the bodily traveling, or gyrating, friction wheel will effectuate the driving of the shuttle, at a high rate of speed, and in the most desirable manner possible. Preferably, the bevel of the said driving friction wheel and the anti-friction idlers of the shuttle truck, or frame, is such as to coincide with the angle at which the upper threads of the warp shed lie, while passing between these contacting, bevel-wheel surfaces, during the rapid travel around the shuttle track of the said shuttle, and the said shuttle-driving device, and, hence, these upper threads of the shed are not only subjected to the least possible wear and tear, but are agitated, or vibrated, as little as possible, by the rapid flight of the traveling devices. By making the rim-gear e^3, vertically adjustable, and having the spindle which carries the pinion f, and the friction driving-wheel f^2 adjustable in the direction of the axis of the latter, I am enabled, both in putting together the parts of the machine and, subsequently, as occasions and conditions may require, to put and keep the shuttle-driving mechanism or devices thereon, in a state of perfect adjustment and perfect working order, or relative arrangement.

It will be seen from the drawings, that the circular shuttle tracks F′, F′, are firmly supported upon the seats b^3, and the inner ends of the radial arms F^2, and it will be observed, that, only four of these arms extend (inwardly of machine) beyond the outer rail of the track. By this arrangement and novel construction of the shuttle-driving mechanism, no matter whether there be one, or more, shuttles, and a corresponding number of driving friction wheels, I not only avoid the presence, at the middle portion of the loom frame, of all the gearing, or geared parts, which have to be kept lubricated, and thus avoid all possible damage to the fabric which is being handled at the middle of the loom, and beneath the working parts thereof, but I also leave comparatively unobstructed, for the convenience of the operator, the central portion of the circular weaving machinery; so that, not only can the operator easily see and keep track of the conditions and operations of all the threads and operative parts of the machine which he is to manage, but can also more conveniently reach up, into the central, open, space of the loom, for the purpose of performing any necessary operations upon any of the threads used in the weaving operation, or upon any of the devices connected with said threads.

In my patented loom the shuttle has to be taken out from above, but the capacity my present machine possesses, for the extrication of an empty bobbin, and the substitution therefor of a fresh bobbin, from beneath the shuttle and track, is, I think, of great advantage, and I consider the means by which this end is gained an important part of my present invention. By having the truck wheels of the shuttle always roll on the rubber roadways t, the threads of the lower shed, which have to be ridden over by these truck wheels, while the threads lie radially across the track, will not be cut, broken, or injured, by the concussive, or abrasive, action of the contacting surfaces of the track and truck wheels; and by having the rubber-road-ways t, inlaid, or let into circular recesses, in the metallic tracks (in which recesses they are tightly fitted, and above the top surfaces of which tracks they slightly project as shown), the said road-ways, or soft, or yielding, material will, I have found, by experiment and practice, remain unloosened and keep in working condition much better and much longer than under any other arrangement of them that I have been able to devise, or know of. I, therefore, consider this special arrangement, or method of combination of the soft material road-ways, and the metallic circular tracks of great importance.

The shuttle frame K^2, is provided with an outer and an inner pair of track wheels r, the outer wheels being, of course, larger than the inner ones, and all the wheels having the axles set at the proper angles, and their peripheries properly beveled to run perfectly on the circular tracks shown.

r^3, are guide wheels arranged in about horizontal planes, and which travel in peripheral contact with the comb-like, or toothed, vertical rim G; two of said wheels being arranged to bear externally against the rim G, and the other two against the inner surface thereof; all as clearly shown, and thus the shuttle, in its rapid, circular, flight, is held, laterally, to and guided by, the comb-like rim G.

At each end of the shuttle frame (see Fig. 2) is a bearing box r^3, and r^4, the first named of which is provided with a tail-piece, K^3, having a groove j, and also a central cylindrical cavity, or axial recess, j^2, adapted to receive the projecting end of the spindle K^4, of the bobbin; the said sliding tail-piece operating to hold the bobbin in place, laterally, while a spring catch j^3, which engages, as seen, with groove j, holds it and the tail-piece endwise.

At the end of the shuttle-frame, opposite that where said tail-piece is located, is located the friction-wheel, or head L, (see Fig. 4,) the teat-like journal L^5, of which turns in the bearing-box r^4, and which at its inner end is recessed out and formed with a hub, having a tapering axial cavity, in which is accommodated, so as to turn freely, the outer end of the bobbin-spindle K^4. The recessed side of the said friction-wheel L, is also formed, or provided, with one member L^6, of a "dogging," or clutching, device, the other forked member f^6 of which is on the outer surface of the bobbin head L^4; the construction being such (as shown at Fig. 4) that the bifurcated projection f^9, of the bobbin-head will engage with the female member L^6, in the recessed face of the friction wheel L, and effect an engage-

ment of the parts, so that, in turning on its axis, the bobbin must rotate the said friction wheel.

To the grooved periphery of the wheel L, is applied a brake-band q, preferably of metal faced with raw-hide, that nearly encircles it; and one end of the band as shown terminates in a threaded rod, or shank, q^8, which passes through a hole in the projection q^5, of the frame, where it is provided with a thumb-nut and jam nut, and has strung on it a spiral tensional spring q^4, all as shown. The outer end of the said band-brake is fastened to the short, pivoted, lever, q^7, by means of a pivotal connection, that is placed a short distance from the hinge point, or pintle q^9, by means of which the said lever is hinged to a projecting stand of the shuttle frame. The pintle q^9, has also fast to its inner end the root of an arm q^6, which, at its outer end, carries a brake-pad q^{10}, that constantly bears, or presses, upon the peripheral surface of the wound thread of the bobbin. The function and effect of this brake-mechanism, or group of bobbin devices, are to offer to the bobbin an impediment to its rotation, as the filling thread is unwound from it, and to effect a uniform impediment to the rotation of the bobbin, notwithstanding the fact that the unwinding thread pulls off with a constantly varying leverage on the rotatory bobbin. This mechanism is therefore an automatic, equalizing, or compensating tension device; since it causes a uniform hold-back force, or tension, to be exerted on the out-going bobbin thread, though the bobbin is acted upon by a thread-pull that continually varies in the degree of leverage, or power, it exerts on the bobbin. Just in proportion as the leverage of the pulling thread on the bobbin decreases, does the power of the friction band-brake over the brake-wheel decrease; because, as the diameter of the cylindrical mass of bobbin thread decreases, the brake-pad q^{10}, approaches the axis of the bobbin, and in so doing turns the short lever q^7, so as to ease up on, or loosen, the grip of the brake-band, or strap. By means of the spring attachment and thumb nuts, the degree of tension, or the force of the brake, is adjusted to the desired condition, to suit the kind of work being done, and other surrounding circumstances, and then the mechanism works automatically. The thread of the bobbin passes therefrom back and forth over, first, the curved, or arched, guide-wire s^5, then over the spool-like traveler s^9, and thence through the guide eye s^6, to a rotatory tension device, which consists of the peripherally grooved wheel s^7, around which the thread makes, say about two turns, and a band-brake device connected therewith. From said tension device the thread passes, as shown, to and through an eye in the batten-shoe s^8, which is formed at the end, or point, of the spreader S^9; the said batten-shoe, operating to lay the filling thread tightly around the weaving-pin o^2, and properly between the warp threads, as usual. Combined with the said peripherally grooved wheel S^7, that turns freely on its spindle $e\ f$, is the band-brake S^{10}, one end of which is adjustably connected (see Fig. 2) through the medium of a threaded link and a thumb nut to the ear-piece $a\ b$, of the stand on which the tension device is mounted; and the other end of which is similarly connected to another ear-piece of said stand, except that a compressible spiral spring $c\ b$, is arranged, as shown, between the ear-piece and the thumb-nut $c\ d$. By means of this band brake, thus arranged (which is quite analogous to the band-brake applied to the friction-wheel of the warp beam in my other Case No. 388,417) an elastic, or spring, friction impediment to the turning of the grooved wheel S^7 is afforded; and in case of a reversal of the spreader, and hence of the direction in which the thread is led off from wheel S^7 (as indicated by the dotted lines at Fig. 2), the elastic brake-band device must, of course, be reversed, so that the end-link seen in ear-piece $a\ b$, and its thumb-nut, shall engage with the other ear-piece, and the link provided with the spiral spring $c\ b$ and nut $c\ d$ shall be directly combined with ear-piece $a\ b$. This reversibility of the elastic band-brake S^{10}, which can be manipulated by most any one, as occasion may require, permits the reversal of the other parts of the loom (for the well known purposes) without changing the designed operations and effects of my said novel rotatory tension device. Said spreader S^9, instead of being permanently attached to the shuttle frame as heretofore, is removably combined with said frame, so that the said spreader can be readily removed, and replaced in a reversed position, as plainly illustrated by the dotted lines at Fig. 2, whenever it may be desired to run the loom in a reverse direction.

The brake-band S^{10}, of the rotatory tension device, is anchored, at one end, to an ear piece, a, b, of the shuttle frame and at the other end has a threaded extension which passes through another hole in said ear-piece, and is provided with a compressible spiral spring $c\ b$, and thumb nut $c\ d$; all in such manner that the band can be adjusted, to exert any desired degree of brake-power (of a yielding, or elastic, character) on the brake-wheel, and thus regulate the turning of the rotatory tension device as may be required.

At each end of the shuttle frame is a bent ribbon-like bar $g\ h$ which, as shown, encompasses the inner guide-wheels r^2, and is shaped so as to perform the functions of a spreader, (to open out, if necessary, the warp thread-shed as the shuttle enters it,) and a guard, to guide the threads, or prevent their getting caught in any of those devices of the shuttle that first enter the shed. From the upper surface of said guard, or spreader, the lower shed threads will pass, certainly, beneath the shuttle truck wheels; while the upper ones pass along over the bail-like guard s^3, which in-

sures the clearance of the shuttle, by all the upper threads of the shed and is an important device in my improved machine.

B^5, is a four-armed, rotatory, frame which, as shown, is secured to and is driven by the central, tubular, shaft of the loom, all as fully described in my Case No. 388,417. The outer end of each of the radially arranged arms of this rotatory frame is formed, or provided, with a hub-like socket, *g*, in which is placed, and secured, by set screws, the inner end of a non-rotatable arbor, f^4, the outer portion of which carries a sleeve-like hub, or rotatory, thimble, *f'*, at the outer end of which is a bevel pinion *f*, (composed preferably of raw hide, or "vulcanized fiber,") and at the inner end of which is fastened the friction driving wheel f^2, the peripheral surface of which is composed of rubber compound, or other yielding, or elastic, material; all as clearly shown. Preferably the arbors f^4 are made hollow to constitute oil reservoirs, from which, through suitable radial ducts, oil is supplied to the bearing surfaces between the said arbors and the sleeve-like devices *f'* which rapidly and continuously rotate thereon. In practice this means for automatically and thoroughly lubricating these parts, is quite important. I have preferably shown the pinion *f*, as engaging with a bevel pin-gear; but some other form of rim-gear may, of course, be used; though the specific construction shown, I have practically tested, very thoroughly, and found to be perfect in its operation, durable, and comparatively frictionless. The wheels f^2, it will be seen, are arranged in pairs (see Fig. 9) each pair straddling, or encompassing, the two idlers, or anti-friction wheels, no^2, of the shuttle, in such manner that the shuttle will have some play between the drivers, as shown. Of course, when the loom is running in one direction, one of the wheels *f*, is the shuttle driver, the other acting as a hold back, to check the flight of the shuttle when the machine may be suddenly stopped, and when the loom may be run in the other direction, these two wheels, f^2, exchange functions.

In another case filed by me, Serial No. 388,417, are shown and described some of the devices herein shown; but I disclaim, in this case, any devices, or features of invention, common to the drawings and descriptions of the two cases, and embraced in the claims of my said other case.

Having now so fully explained the several novel features of my improved loom that those skilled in the art can understand and practice my invention, either in a loom precisely like that shown, or under some mere modification of my invention, and wishing it to be distinctly understood that less than all of the described novel features may be used in one machine with good results; though I prefer to embody in the same machine all the new devices and combinations of devices herein described, what I claim as new, and desire to secure by Letters Patent, is—

1. In a circular loom, a two rail shuttle track, and radially arranged supports for the two rails which, as shown and described, are arranged so that sufficient space is left between the supports to the inner rail to permit the removal, downwardly, between said supports and the two rails, of the bobbin of a shuttle; substantially as hereinbefore set forth.

2. In a circular loom, the combination with the metallic tracks, having grooves, or circular recesses, therein, of road-ways *t*, composed of rubber compound, or other soft, or yielding, and elastic material and tightly fitted in said recesses, so as to project slightly above the top surfaces of the tracks; all substantially as and for the purposes set forth.

3. In a circular loom, the combination with the circular shuttle-track, of the toothed rim G, arranged about at the inner perimeter of the outer rail of said track, as specified, for the purposes hereinbefore described.

4. In a shuttle mechanism for circular looms, the combination with a shuttle frame, formed, or provided, with a bearing box at each end, of a sliding tail-piece K^3, arranged in one of said bearing-boxes, and having a central cavity, or socket, as at j^2; a friction head, or wheel, L, the journal of which is mounted to turn in the other one of said bearing boxes, and which is provided, as specified, with one member of a dogging device; a bobbin, the spindle of which, at one end, engages with the socket of said tail-piece, and which bobbin, at the other end, is provided with means for engaging the dogging device member of wheel L; and means for locking in place, endwise, the said sliding tail-piece; all substantially as and for the purposes set forth.

5. In combination with the bobbin and frame of a shuttle mechanism, the reversible spreader S^9; and a rotatory tension device, having a reversible and adjustable friction brake device applied thereto; as and for the purposes set forth.

6. In a circular loom, the combination with the shuttle frame, provided, as usual, with the wheels r^2, of the spreading-guards *gh*, arranged at either end of the said frame, as shown, and operating to spread apart the shed threads and guide them clear of the advance parts of the shuttle, as the latter enters the shed; all substantially as and for the purposes set forth.

7. In a circular loom, the combination, with the circular shuttle-track; a shuttle truck provided with wheels to travel thereon, and also with the anti-friction wheels, or idlers, as specified; the central rotatory shaft of the loom; and arms made fast, at their inner ends, to said central shaft, of a shuttle-driving device composed, essentially, of friction-wheels arranged to contact with the said idlers, and mounted so as to rotate about their own axes at the outer ends of said arms; all substantially as hereinbefore set forth.

8. In a circular loom, a shuttle-driving

mechanism, comprising, the central shaft of the loom; suitable friction driving-wheels; arms mounted fast, at their inner ends, on the said central shaft; a rim-gear, arranged concentrically with but above the shuttle track of the loom; and pinions running in engagement with said rim-gear, and that are mounted on the same axes with the said driving-wheels, and that rotate the latter; all substantially in the manner hereinbefore set forth.

In witness whereof I have hereunto set my hand this 6th day of April, 1891.

ALBERT DE LASKI.

In presence of—
J. N. McINTIRE,
M. E. FOXTEN.