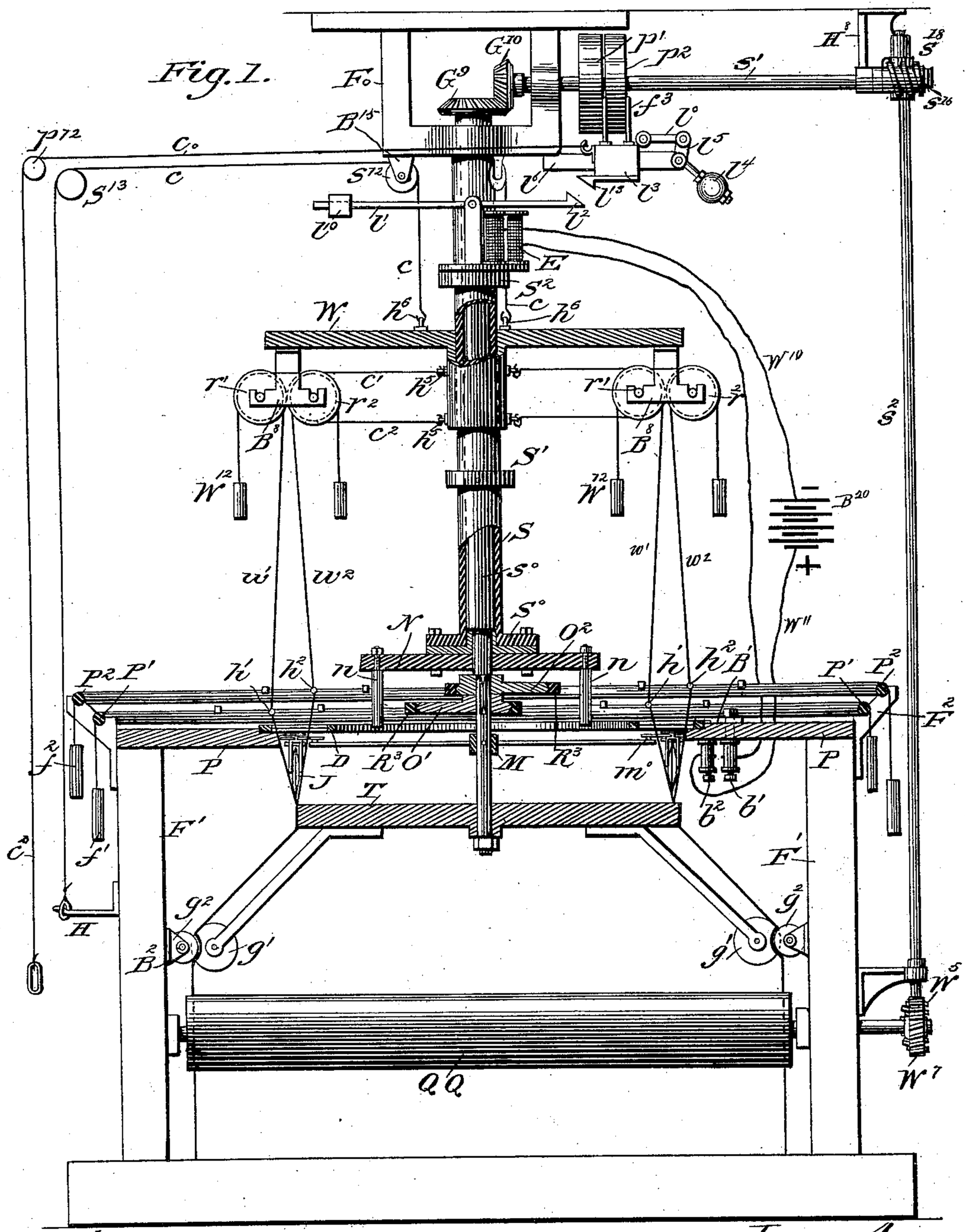
(No Model.) 3 Sheets—Sheet 1.

G. WASSERMAN.

CIRCULAR LOOM.

No. 359,414. Patented Mar. 15, 1887.

Fig. 1.



Witnesses.
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By A. Lum
Attorney.

(No Model.) 3 Sheets—Sheet 2.

G. WASSERMAN.

CIRCULAR LOOM.

No. 359,414. Patented Mar. 15, 1887.

Fig. 2.

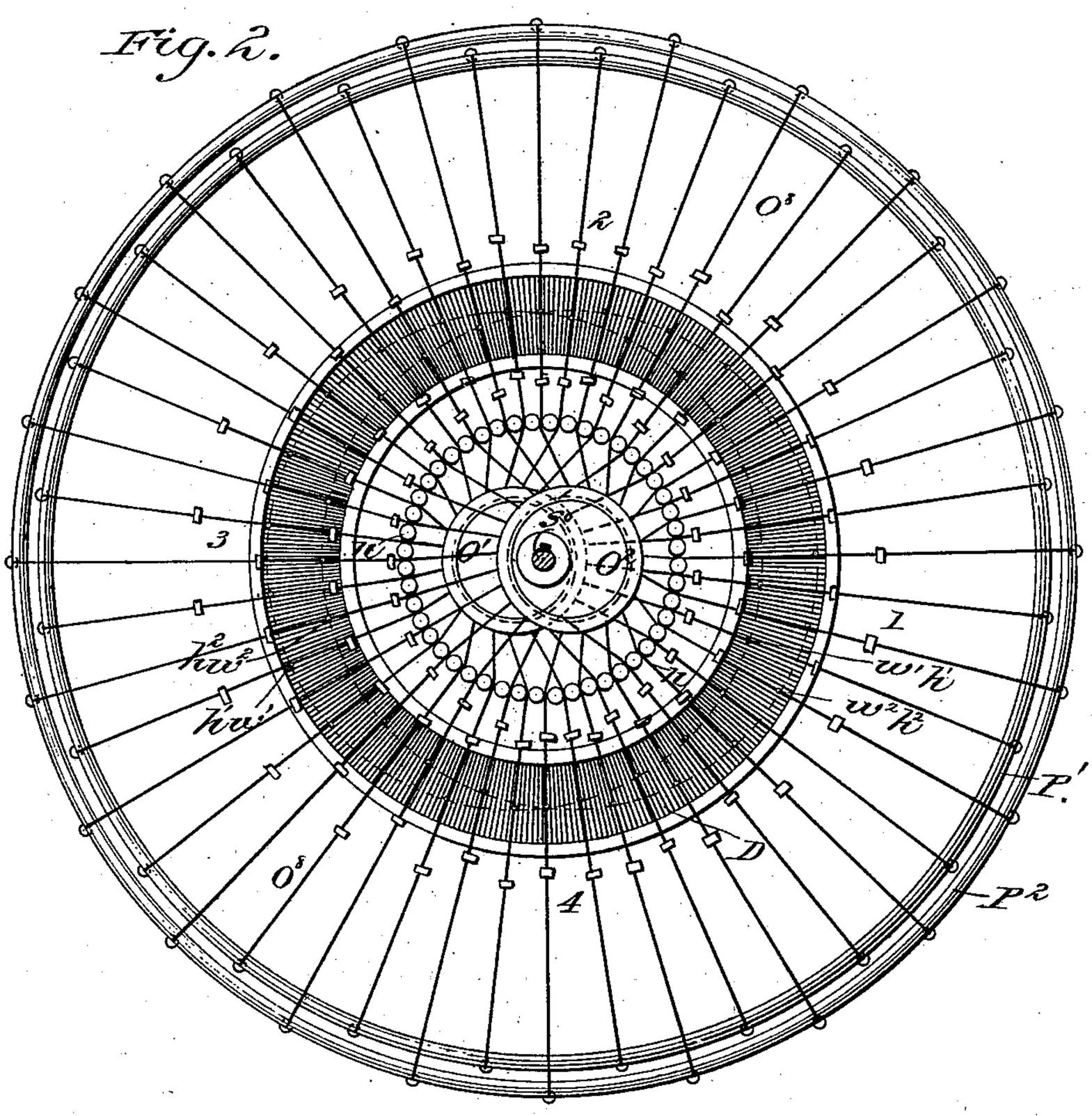
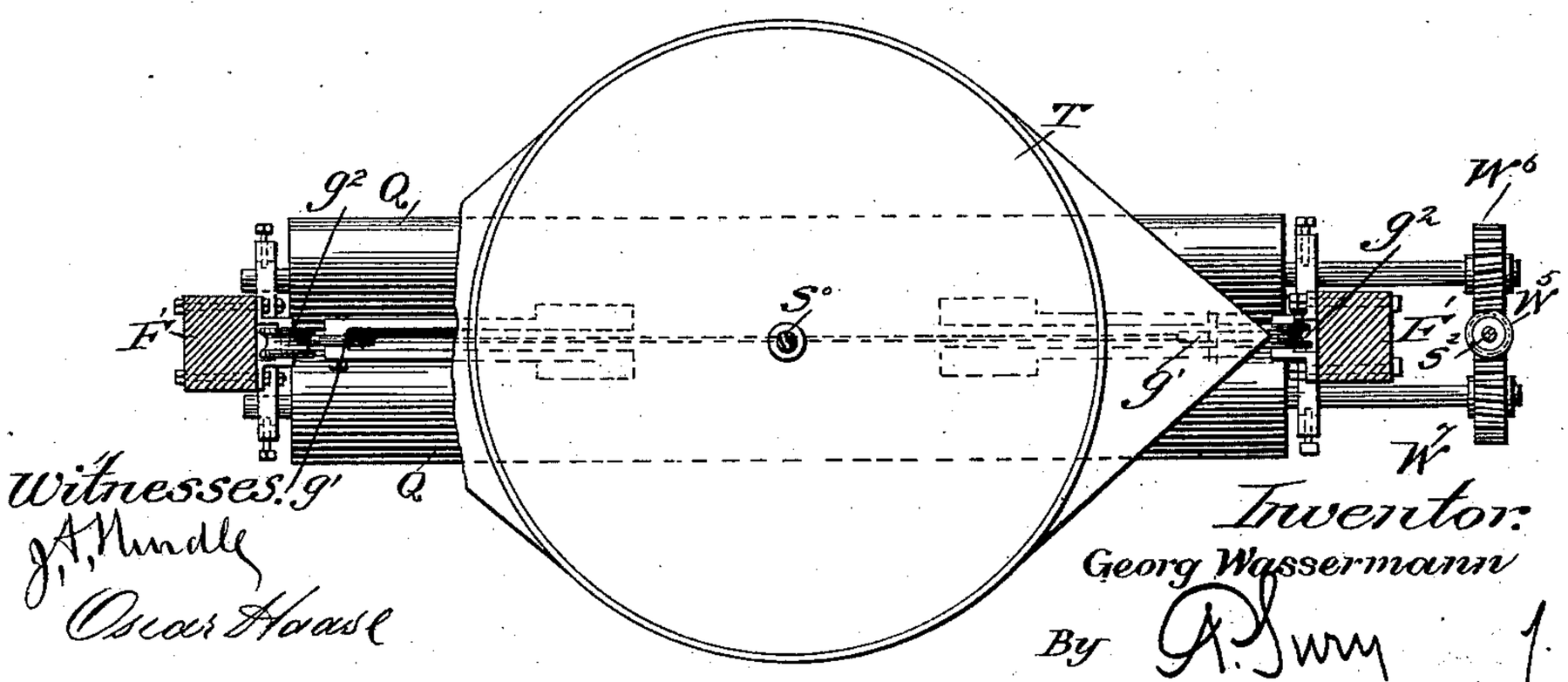


Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

G. WASSERMAN.

CIRCULAR LOOM.

No. 359,414. Patented Mar. 15, 1887.

Fig. 3.

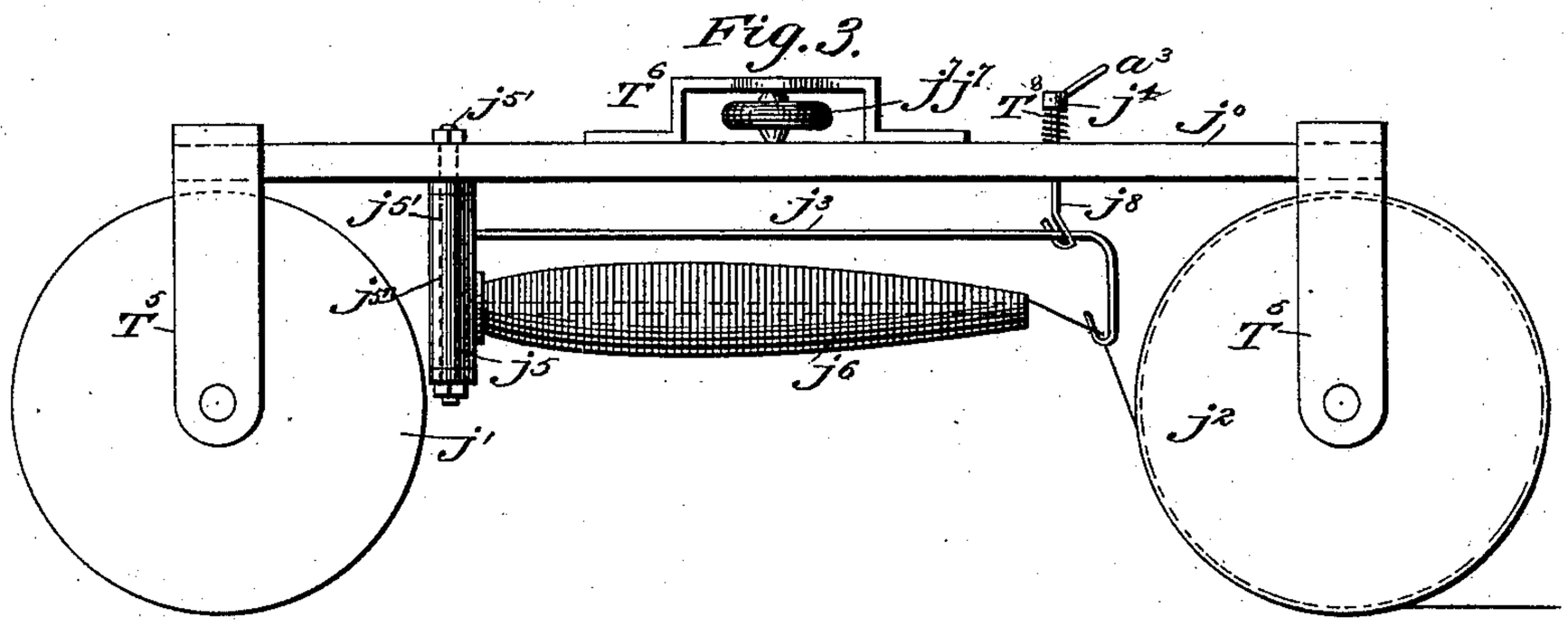


Fig. 4.

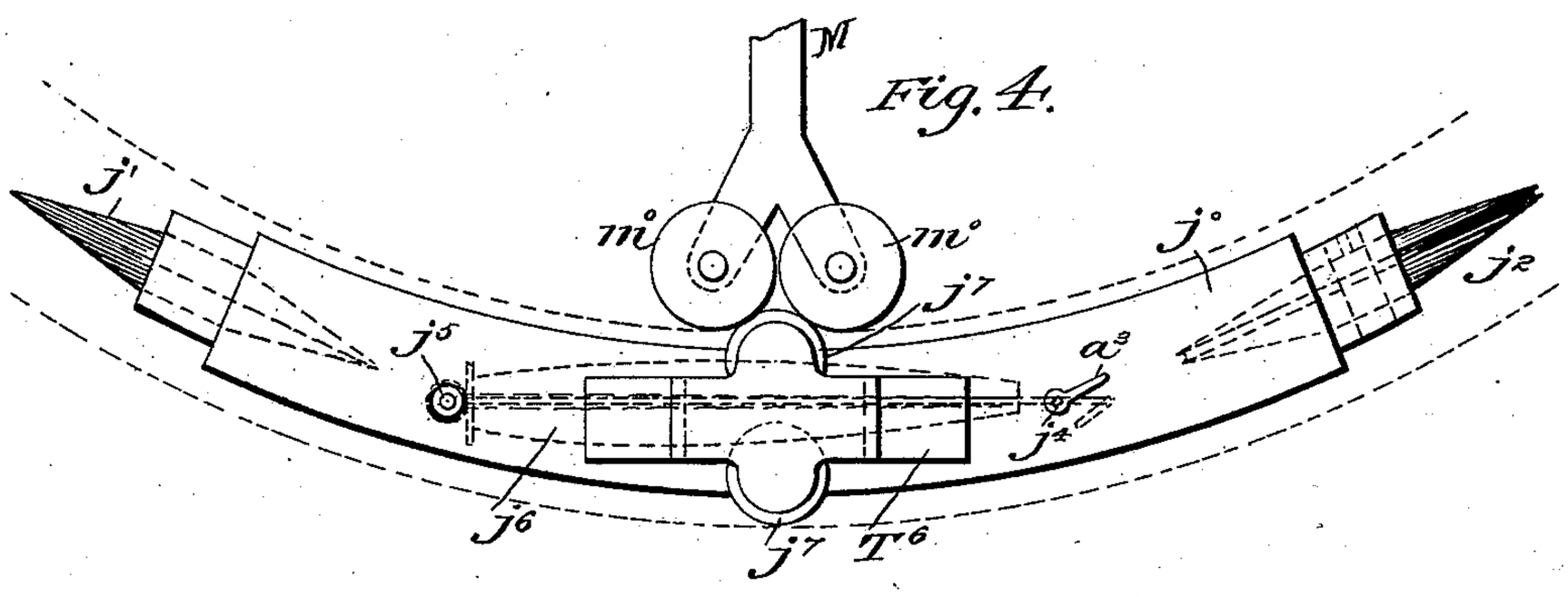
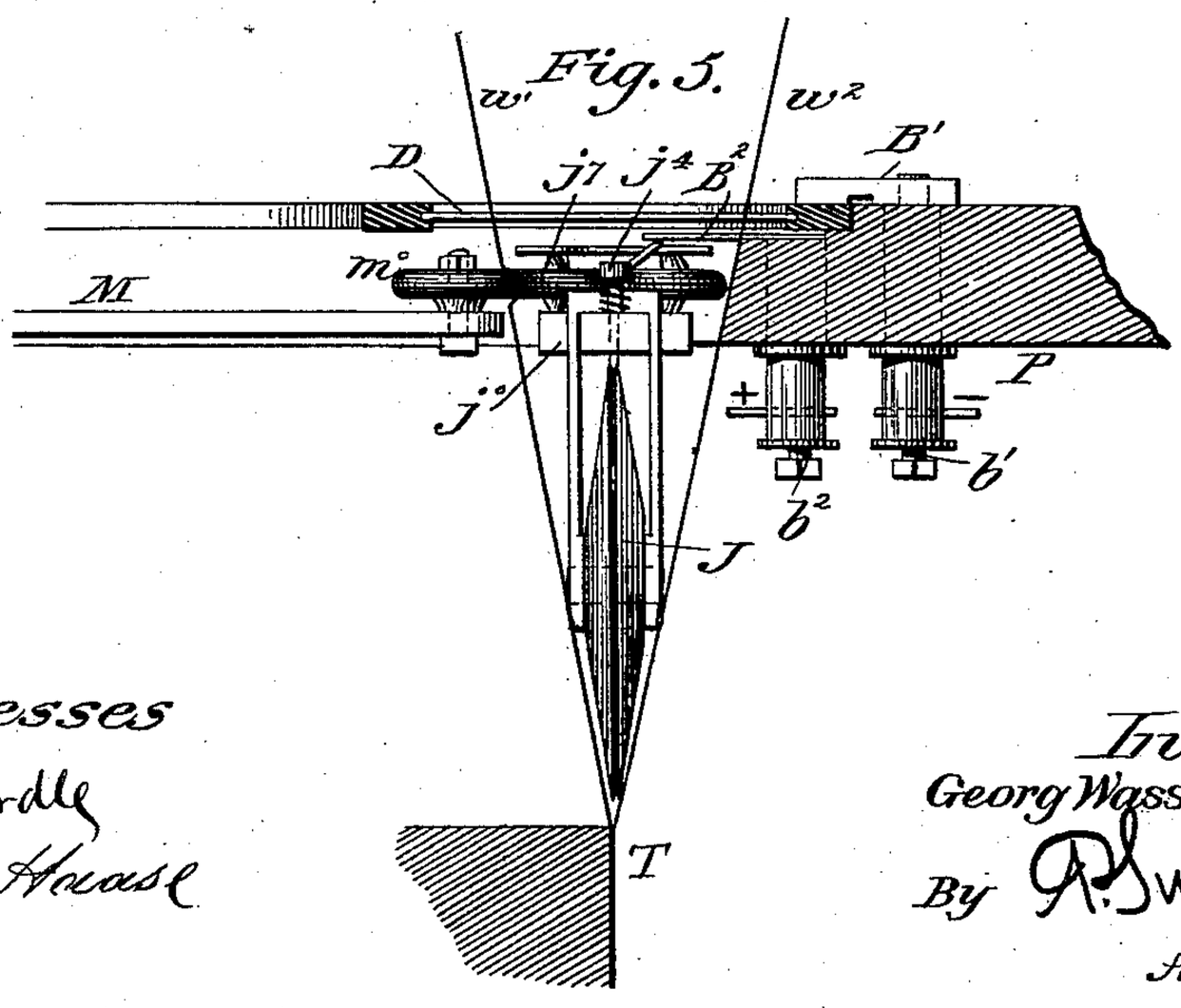


Fig. 5.



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Attorney

UNITED STATES PATENT OFFICE.

GEORGE WASSERMAN, OF AUSSERSIHL-ZURICH, SWITZERLAND.

CIRCULAR LOOM.

SPECIFICATION forming part of Letters Patent No. 359,414, dated March 15, 1887.

Application filed January 2, 1885. Serial No. 151,876. (No model.) Patented in England October 13, 1884, No. 13,533; in Belgium October 31, 1884, No. 66,582; in Italy December 3, 1884, XVIII, 17,492; in Austria-Hungary December 23, 1884, No. 38,394 and No. 60,511, and in France February 16, 1885, No. 164,776.

To all whom it may concern:

Be it known that I, GEORGE WASSERMAN, a citizen of the Republic of Switzerland, residing at Aussersihl-Zürich, in Switzerland, have invented certain new and useful Improvements in Circular Looms, of which the following is a specification.

My invention relates to circular looms for the manufacture of all kinds of tubular fabrics, and especially for such articles of large dimensions; and it consists in the construction and combinations of parts hereinafter described and claimed.

My improved circular loom is constructed with a horizontal annular plate, which is properly supported upon stands or posts, and to the inner edge of which the reed-plates are secured in a circle, with the dents of the plates arranged radially. In the center of said plate a vertical shaft is provided, journaled within a long sleeve, which is secured rigidly fast or cast to a frame attached to the ceiling. Said central shaft receives a rotary motion by means of a bevel-gear secured to its top end and engaging the bevel-gear of the driving-shaft, and said vertical central shaft carries at its bottom end a journaled circular plate, which serves as a templet for the web, and which guides the same just underneath the shed from the tubular shape over into the shape of a sheet or of a collapsed cylinder. The web, after passing the templet, is seized by strong press-rollers and folded into a flat shape by means of suitable guide-rollers, which are journaled to brackets secured to said templet and to the stands supporting the annular main plate. The press-rollers are journaled in bearings provided, also, on the said stands last mentioned, and receive their motion from the driving-shaft by means of an intermediate shaft and worm-gears. The vertical shaft in the center of the annular main plate is further provided with a set of eccentric disks for moving the harness and for throwing the warp-threads. Said shaft is also provided just in the plane of the annular main plate with a spider having two arms secured rigidly fast, at the ends of which small journaled rollers are provided for impelling the shuttles along the raceway, which is on the inside of the annular main plate, just underneath the reed-plates. Each eccentric disk has a ring fitted to its periphery, unto the periphery of which ring the harness-twine is attached. Said twine is kept stretched by means of weights attached to the ends thereof, and runs over annular railings provided above the outer edge of the annular main plate. While the eccentric disks are revolving, the ring to which the harness-twine is attached will remain stationary, and said ring will only be rocked according to the amount of the eccentricity of the disks. The harness-twine is provided, as is usual, with heddle-eyes, through which the warp-threads run, and by means of these the warp-threads are thrown according to the rocking of the rings on the two eccentric disks. As there are two eccentric disks, with rings R^3 mounted loosely on the periphery thereof, also two systems of harness-twine are to be found, one above the other. These two systems, each of circular shape, are moved eccentrically relatively to each other, so that the warp-threads, which are connected alternately to the harness-twines of the two rings upon the disks, are thrown into the two sheds. The largest widths of these sheds will be diametrically opposite each other, corresponding to the relative position of the two eccentric disks, and in this widest part of each shed the shuttles are moved to lay the woof-thread. As the shuttle moves along, the point of interweaving of the warp-threads moves along likewise, and the web is thus built up continuously and properly.

In order to maintain the equidistance between the harness-twines, the same are run through between rods which are arranged in a circle bolted rigidly fast to a plate which is bolted to the bottom flange of the sleeve of the vertical shaft. The warp-threads are wound upon journaled rolls arranged in a circle radially underneath a plate, which is sleeved over the sleeve of the central shaft. Said plate is suspended by means of cords which run over suitable pulleys, said cords being fastened to hooks provided on the plate and on the stands supporting the annular main frame of the machine. Said journaled warp-rolls are prevented from unrolling freely by means of brakes, each of which consists of a cord which is wound around a grooved part of

one of said warp-rolls, said cord being attached with one end to the sleeved plate, and carrying at the other end suitable weights. Owing to said brakes the warp-rolls will always keep the warp-threads taut. Whenever these threads have to be slackened, the cords by which the sleeved plate supporting the warp-rolls is suspended must be detached from the hooks on the stands of the framing, and then the plate may be lowered, which will cause the warp-threads to slacken.

In case the woof-thread should break, an electrical arrangement causes the driving-shaft to stop by shifting the driving-belt of the loom on the loose pulley. This electrical arrangement mainly consists of two binding-posts, which are screwed from underneath, but insulated into the annular main plate, one post being connected to a contact-piece which is provided just underneath the reed-plates, but above the raceway of the shuttles, and the other post connected to the reed-plates. The wire clamped by one of said binding-posts leads to an electro-magnet, which attracts or releases an armature attached to a fulcrumed lever, which engages with the belt-shifter by means of a suitable latch device, and the wire from the other post leads to the source of electricity, the other pole of which is also connected to the said electro-magnet. The said latch arrangement is so devised that when the armature of said fulcrumed lever is released the latch arrangement is locked, and then the belt is held on the driving-pulley and the loom is running. The armature is released when no current is in the electro-magnet, and the current of the electrical arrangement ceases or is broken when no electrical connection is made between the reed-plates and contact-piece. When, however, this connection is made the current is established and the armature will be attracted, the latch arrangement will be unlocked, and the belt-shifter will move the belt on the loose pulley. The said connection will be made through a shuttle as soon as the woof-thread breaks, because then a wire spring, before held down by the tension of the woof-thread, will be released, and will strike against the reed-plates, and moving along with the shuttle will finally strike also against the contact-piece, whereupon, the connection being made, the latch device will be unlocked and the loom will be stopped.

I shall describe my invention with reference to the accompanying drawings, in which—

Figure 1 represents the loom, partly in elevation and partly in central vertical section. Fig. 2 shows a plan of the harness arrangement with the eccentric disks, the central shaft being cut off just above the said eccentric disks. Fig. 3 represents a front elevation of one of the shuttles. Fig. 4 represents a plan of a shuttle and a part of the driver or spider. Fig. 5 represents a sectional detail showing the annular plate, the reed, a shuttle, a part of its driver, and a portion of the stopping devices. Fig. 6 gives a plan of the templet with press-rollers, the loom being cut off just above the said templet.

Similar letters of reference in different figures indicate corresponding parts.

There are many parts in my loom to which I lay no claim and which are incidental to my invention. Said parts also being familiar to all skilled in the art, I shall not describe these parts with more minuteness than is necessary to enable others to understand my invention.

In Fig. 1, P denotes the annular main plate of the loom. Said plate is supported by means of the two posts or stands F′, and is provided at its inner edge with the reed-plates D. These reed-plates are secured to said plate P, and form a continuous ring with the dents or reeds set radially, pointing all toward one common center. In this center the vertical shaft s^{o} is provided, supported by and journaled within the sleeve or pipe S, said sleeve projecting downward from the frame F^{o} and being cast together with the same.

The frame F^{o} is to be bolted against the ceiling of the room, wherein the loom is placed and supports all the parts of machinery inside of the web. Shaft s^{o} is provided at its upper end with a bevel-gear, G^{9}, keyed thereon and engaging with a bevel-gear, G^{10}, at the end of the driving-shaft, s^{2}. This shaft s^{2} is journaled at one end within frame F^{o}, and at the other end in a hanger, H^{8}, which is bolted against the ceiling. The driving-shaft s^{2} is provided with the loose pulley p^{2} and the fast pulley p', and receives motion from a suitable source of power by means of a belt on pulley p'. At the bottom end of the sleeve S a flange, S^{o}, is cast, and a plate, N, which is sleeved over shaft s^{o}, is bolted to the said flange S^{o}, said plate carrying a number of vertical rods, n, which are arranged in a circle and bolted rigidly fast near the edge to the plate N. Just underneath the said plate, and within the cylindrical space formed by said rods n, a set of two eccentrics, O′ and O^{2}, is keyed on shaft s^{o}. These eccentrics are set with their eccentricity just diametrically opposite each other, as may be seen in Fig. 2, and each eccentric is provided at its periphery with a ring, R^{3}, loosely mounted thereon, unto which the harness-twine O^{8} are attached, and which rings, therefore, will not revolve with the eccentrics, but will only be rocked according to the amount of the eccentricity of the said eccentrics. The harness-twines are alternately attached to the rings R^{3}, mounted on the peripheries of the upper and to the like ring on the lower of said eccentrics O′ O^{2}, and are spaced by means of the rods n. From the eccentrics said twines run horizontally through between said rods n over circular railings P′ P^{2}, which are supported by means of brackets F^{2}, attached to the posts F′, (see Fig. 1;) and for the plan of the railings, see Fig. 2.

Suitable weights, f' f^{2}, are secured to each of said harness-twines and keep the same taut, said weights being visible in Fig. 1. The

harness-twines, which are provided with the usual heddle-eyes, h' h^2, by running through the rods n, will prevent the rings on the eccentrics O′ O² from revolving, and as said twines are alternately attached to the rings on the upper and lower eccentric, O′ O², there will be two systems of horizontal harness-twines, one above the other, moving in a radial sense and in opposite directions from each other, according to the revolutions of shaft s^o. Thereby the warp-threads w' w^2, which are guided by the heddle-eyes h' h^2, respectively, are thrown so as to form two sheds diametrically opposite each other, which will be understood by inspecting Fig. 2.

The warp-threads are arranged vertically in shape of a cylinder all around a plate, T, which is journaled to the bottom end of the shaft s^o. This plate T, which will remain stationary when shaft s^o revolves, serves as a templet for the web, and is provided just underneath the shed. The web, therefore, is already completed when the warp-threads reach said plate, and below said plate suitable press-rollers, Q, which may be seen in plan in Fig. 6, are provided, said rollers being journaled within suitable bearings, B⁸, attached to the posts F′. Said rollers receive motion from the driving-shaft s' by means of the shaft s^2, the lower end of which is provided with the worm W⁵, with the thread thereof meshing into corresponding threads of the worm-wheels W⁶ W⁷, which are arranged diametrically opposite each other and rigidly fixed on the horizontal shafts of the said rollers, the shafts having their bearings supported by the part F′. By this worm-gearing the rollers are caused to work together and at the same time, feeding the folded tubular web downward. Said web is first stretched out flatly by means of the rollers g', which are journaled on suitable brackets, B¹⁰, attached underneath plate T and inside of the web. The rollers g' press the cloth into the grooved rollers g^2 on the outside of the web, said rollers g^2 being journaled on brackets B¹², attached to the posts F′. The warp-threads are thus kept stretched and fed downward, owing to the revolving press-rollers Q. Above the reed-plates the warp-threads are wound onto the warp-rolls or warp-carriers r' and r^2. These rolls, one for each warp-thread, are arranged in two concentric circles within socket-bearings B⁸, which are bolted to the bottom face of plate W. The rolls are set radially, and each roll has a flange grooved like a sheave, over which sheave-like flange cords are running, such as are shown in Fig. 1 at c' c^2. Each cord is attached by one end to a hook, h^5, provided on the sleeved part of plate W, and attached at the other end to a weight, W¹², so as to produce a friction within the grooves of said rolls when the latter unwind. These cords with their weights will act therefore like brakes on the warp-rolls, and will prevent the same from unwinding faster than the tension and the feed of the woven fabric necessitates.

Two collars, S′ S², are rigidly fast on the pipe S above and below plate W. If it becomes desirable to slacken the warp-threads, plate W is let down until it rests on the lower collar, S′. The cords c, of which only two are visible in Fig. 1, are attached to hook h^6 on top of the plate W, and from there are run over small sheaves S¹², which are journaled in small brackets B¹⁵ on the frame F°, to other suitable sheaves, S¹³, and from there to hooks, one of which is shown in Fig. 1 and marked H. The cords are attached to these hooks when the plate W is raised into its normal position, and have to be removed from these hooks when plate W is to be lowered.

Owing to the peculiar way in which the eccentric disks O′ O² are set, and to the peculiar manner of connecting the harness-twines with the rings R³, mounted on the peripheries of said eccentric disks, the warp-threads will be thrown so as to form a shed just underneath the reed-plates, said shed beginning above the plate T. In this shed two segmental shuttles move to lay in the woof-thread, said shuttles being always kept diametrically opposite each other by means of the two-armed spider M. Each shuttle (see Figs. 3, 4, and 5) is a two-wheeled truck consisting of the segmental piece j^o, which is curved according to the radius of the templet T, and at the end of which the wedge-shaped wheels j' and j^2 are provided, journaled in U-shaped brackets T⁵, which are attached to the segmental piece j^o. On top of piece j^o two small wheels, j^7, are journaled within a small bracket, T⁶, said bracket being attached to the segmental piece j^o. One of the said wheels j^7 runs on the shuttle-race—that is, on the beveled-off inside portion of the annular plate P (see Fig. 5)—and the other of said wheels j^7 is taken between two wheels, m^o, which are journaled and held at the end of each arm of spider M. This spider M is of such diameter as to keep each shuttle J always in contact with plate P. Of the two wedge-shaped wheels j' and j^2 of the shuttle j' is the head-wheel, while j^2 is the aft-wheel, and this latter has a grooved periphery for receiving the woof-thread, which is laid down by said wheel into the shed above plate T. The woof-thread is wound on a bobbin, j^6, which is slipped over hinged pin j^5, similar to the pins used in other shuttles. This hinged pin j^5 consists of a small metallic wire provided with a tubular head, $j^{5''}$, adapted to receive the vertical pin $j^{5'}$, one end of which is secured to piece j^o, and the other end projects a little below the said tubular head $j^{5''}$, where it is mounted with a screw-nut, thus enabling the pin j^5 $j^{5''}$ to be swung around when removing or replacing the bobbin. The woof-thread, in leaving the bobbin j^6, runs through the hook formed on the slender wire j^3, which is attached to the tubular head $j^{5''}$ of the pin j^5, and said slender wire j^3 is pulled upward by means of the hook on the wire j^8, said wire j^8 running through piece j^o, and being pulled upward by means of a helical spring, T⁸, un-

derneath the head j^4 of wire j^8. This head is provided with a small arm, a^3, projecting in an inclined direction backward and upward. By these wires j^3 j^8 and helical spring a tension will be put onto the woof-thread when the same is running from the bobbin j^6 to the wheel j^2, and should the thread break, it is evident that the helical spring will force wires j^3 and j^8, together with the head-piece j^4, upward until the projecting arm on head j^4 strikes the reed-plates, dragging along over the lower surface of the same while the shuttle is in motion. This fact is made useful for the electrical stop-motion, as will be explained hereinafter.

The shuttles, being placed within the shed underneath the reed-plates D, will bear with their own gravity down into the shed, and as one of the wheels, j^7, of each shuttle is in contact with the inside of the annular plate P, the incline on this part of the plate, which we will call the "shuttle-raceway," will cause the other wheel j^7 to bear against the two wheels m^6 on the spider M, and therefore the shuttle will be moved along as soon as the spider M, which is keyed onto shaft s^6, is revolved together with said shaft. The shuttle, being provided with wedge shaped wheels, rolls over the shed without any danger of being displaced, and thereby exerts a certain wedging pressure unto the warp-threads, which will be very beneficial to the tightness of the web.

In Fig. 5 the end elevation of the shuttle is shown as if piece j^9 were not bent, but as if the same were straight. This has only been done for convenience sake, in order not to complicate the drawings.

The electrical stop-motion of the loom is arranged as follows: Shaft s', which is the driving-shaft, and imparts motion, as described, by means of bevel gear-wheels, to shaft s^6, and by means of a worm, s^{16} and s^{18}, gears to shaft s^2, receives motion by means of a belt from a suitable source of power, said belt engaging the driving-pulley p' or loose pulley p^2, which pulleys are provided on said shaft s'. Said belt is not shown in the drawings, but the fork for shifting the same is shown in Fig. 1. This fork f^3 is secured on a slide-block, l^3, which is fitted so as to slide on the guide-bar l^6, said guide-bar l^6 being cast on or bolted to frame F^6. The slide-block l^3, as shown in Fig. 1, is in front of the loose pulley p^2, and if not otherwise forced to remain in front of the fast pulley p' said block will be kept in the position shown in Fig. 1, owing to the gravity of weight l^4, which is secured on an arm of the angular lever l^5, said lever being fulcrumed on a pin at the end of the guide-bar l^6, and said lever being linked with its other arm to an eye on the slide-block l^3 by means of an intermediate link, l^9. Underneath slide-block l^3 and rigidly fast thereto a latch, $l^{3'}$, is secured, said latch engaging the latch l^2 at the end of the fulcrumed lever l' when slide-block l^3 stands in front of pulley p', and when no current is in the electro-magnet E, which governs the fulcrumed lever l'. This electro-magnet E is mounted on the upper collar, S^2, on pipe S, and is placed underneath the latch-formed arm of lever l', attracting the same when a current is sent through the electro-magnet. The other arm of said lever l' is provided with a counter-weight, l^{10}, which will swing latch l^2 up as soon as the current ceases in the electro-magnet, and thus it will be clear that block l^3, if slid over to the fast pulley, will snap, by means of the latch secured thereon, into the latch l^2 and will lock the belt-shifter, keeping the belt on the fast pulley p'. If, however, the electro-magnet E, a current being sent through the same, attracts lever l', latch l^2 will move downward, the latch arrangement will be unlocked, and weight l^4 will slide the block l^3, together with the belt, over the loose pulley p^2, and the loom will be stopped. If the loom is to be started again, block l^3 is pulled toward pulley p' by means of the cord c^6, which is attached to said block and is guided by means of a suitable pulley, p^{12}, down to the side of the loom. The latch arrangement will then be locked again as soon as latch l^2 snaps into the latch on block l^3, and the belt-shifter will keep the belt on the fast pulley p' until the electro-magnet attracts again lever l'.

The electro-magnet E is furnished with an electric current from a battery, B^{20}, or other source, and the wires W^{10} W^{11} are connected to the two binding-posts b' and b^2 at the bottom side of the plate P, one wire, W^{10}, leading from the negative pole through the electro-magnet to post b', and the other wire, W^{11}, leading from the positive pole to the post b^2. The binding-posts are both insulated from plate P. Binding-post b' is electrically connected to an insulated piece, B', and bridges, by means of the same, the current over into the reed-plates D. Binding-post b^2 is electrically connected to an insulated strip of metal, B^2, which is located underneath the reed-plates, between the same and the raceway of the shuttles. This piece projects far enough over the space traveled through by the shuttles, so as be struck by the small arm a^3, provided on each of said shuttles, as soon as the woof-thread is broken and wire j^8 has moved upward, owing to the action of the helical spring sleeved over said wire. Only one such piece B' and B^2 is provided at a suitable place under the reed-plates. When the woof-thread is broken, the electrical circuit will be completed as soon as piece B^2 is electrically connected with the reed-plates. This is done by the projecting arm a^3 on the wire head j^4, for, as it has been explained in the above, as soon as the woof-thread breaks, said projecting arm will drag along the lower surface of the reed-plates until it meets also piece B^2, and in this moment the electrical connection between reed-plates D and piece B^2 will be made, the circuit is closed, and the electro-magnet will unlock the belt-shifter, thus shifting the belt on the loose pulley and stopping the loom.

I am well aware that circular looms have

been constructed with vertical warp-rolls and horizontal woof-rolls for weaving tubular fabrics over a mandrel—for covering rubber hose, for instance, and for similar purposes. Said devices, however will not answer for weaving a similar web as the loom described in the above specification and illustrated in the drawings hereto annexed. Looms have also been in use heretofore with radially-arranged warp-movers and a shuttle revolved by suitable gearing; also, looms have been known heretofore for weaving tubular fabrics of more than one ply with shifting cams or inclines actuating mechanism for throwing the warps. All these devices I disclaim herewith. Also, looms have been constructed with harness-cams for sliding vertical rods in order to throw the warps; also, circular shuttles with pivoted points have been in use heretofore in circular looms for manufacturing the woven cap-tubes. I also disclaim such devices. Finally, a similar device as shown and described in the above for moving the shuttle through the warp (known as the "positive shuttle-motion") has been used heretofore in looms for weaving flat fabrics. I also disclaim the same.

I am aware that a rotary vertical shaft has heretofore been used in connection with looms; but I am not aware that the rotary vertical shaft was ever before constructed and connected with the mechanism as shown and described in this case.

I am also aware that a traveling carriage has heretofore been used in connection with circular looms; but the construction thereof was entirely different from that shown in this case; but,

What I claim as new, and wish to secure by Letters Patent, is—

1. The combination, with the warp-rolls r' r^2, the brake-cords c' c^2, provided with weights, the sleeved plate W, to which said cords are attached and on which the said warp-rolls are mounted, and the cords c, whereby the said plate is supported, of the harness-twines provided with heddle-eyes h' h^2 and weights f' f^2, the rings to which said twines are attached, the eccentric disks around which said rings are placed, the central shaft, S°, to which said eccentric disks are keyed, the two-armed spider M, provided with friction-rollers M°, and the two segmental shuttles j, substantially as and for the purpose set forth.

2. The combination of the guide-bar, the sliding block having the fork secured thereto, the latch secured to the bottom of the said sliding block, the link having one end thereof secured to said sliding block, and the angular lever provided with a weight on the end thereof with the lever l', having the latch on the end thereof adapted to engage with the latch on the bottom of the aforesaid sliding block, the electro-magnet, and wires leading to a source of electricity, all substantially as shown and described.

3. The combination of the vertical central shaft, S°, with the eccentric disks O′ O², rings R³, the radially-arranged harness with heddle-eyes h' h^2, the weights f' f^2, fastened to the ends of the harness-twines, and the stationary plate N, carrying the vertical rods n, all as and for the purpose set forth.

4. The combination, with a segmental shuttle-body having at each end wedge-shaped wheels, of the hinged spindle secured to said shuttle-body and adapted to carry the bobbin, the wire secured to the spindle aforesaid and adapted to guide the woof-thread, the supporting hooked wire j^8, passing up and through the shuttle-body, the retracting-spring surrounding the said wire and the head-piece and projecting arm secured to the end of the same, the bracket on top of the shuttle-body, and the friction-wheels supported thereby, all substantially as described.

5. The combination of the shuttle-body composed of the segmental piece j^6, carrying a U-shaped bracket at each end thereof, with the two wedge-shaped wheels j' j^2, the spindle j^5, adapted for carrying the bobbin, the vertical pin $j^{5'}$, the wire j^3, the hooked wire j^8, passing through the segmental piece j^6, the head j^4, secured to the wire j^8, the helical spring T⁸, the projecting arm a^3, the bracket T⁶, secured to the top of segmental piece j^6, and the frictional wheels j^7, supported by said bracket, substantially as shown and described.

6. The combination of a source of electricity, wires W¹⁰ W¹⁴, electro-magnet E, and insulated binding-posts b' b^2, lever l', provided with the counter-weight and hook l^2, stationary guide-bar l^6, slide-block l^3, provided with the latch and belt-fork, cord c^6, angular lever l^5, the connecting-link weight l^4, and the driving-shaft s', provided with tight and loose pulleys p' p^2, with the piece B′, reed-plates D, contact-piece B², and the shuttle constructed as a two-wheeled truck, j^6, j', and j^2, and provided with hinged wire j^5, wire j^3, hooked wire j^8, the spring, the head j^4, and the projecting arm a^3, all as and for the purpose set forth and described.

7. A segmental shuttle having a segmental body-piece, j^6, two wedge-shaped wheels, one a plain head-wheel, j', and the other the grooved aft-wheel j^2, hinged wire j^5, slender tension-spring j^3, wire hook j^8, having head j^4, provided with a projecting arm, spring T⁸, and friction-rollers j^7 j^7, substantially as shown and described.

8. The combination, as shown and described, of the stationary circular templet T, placed underneath the shed, with the same diameter as the finished fabric, of the journaled guide-rolls g' and g^2, adapted to stretch the tubular fabric into a flat sheet, the journaled press-rollers Q Q, and mechanism for revolving the same, all for the purpose set forth.

In testimony whereof I hereunto sign my name, in the presence of two subscribing witnesses, this 26th day of September, 1884.

GEORGE WASSERMAN.

Witnesses:

EMIL BLUM,

ED. EGLE.