Sheet 1 - 3 Sheets.

N. B. Carney.

Circular Power Loom.

No. 17,353. Patented May 19, 1857.

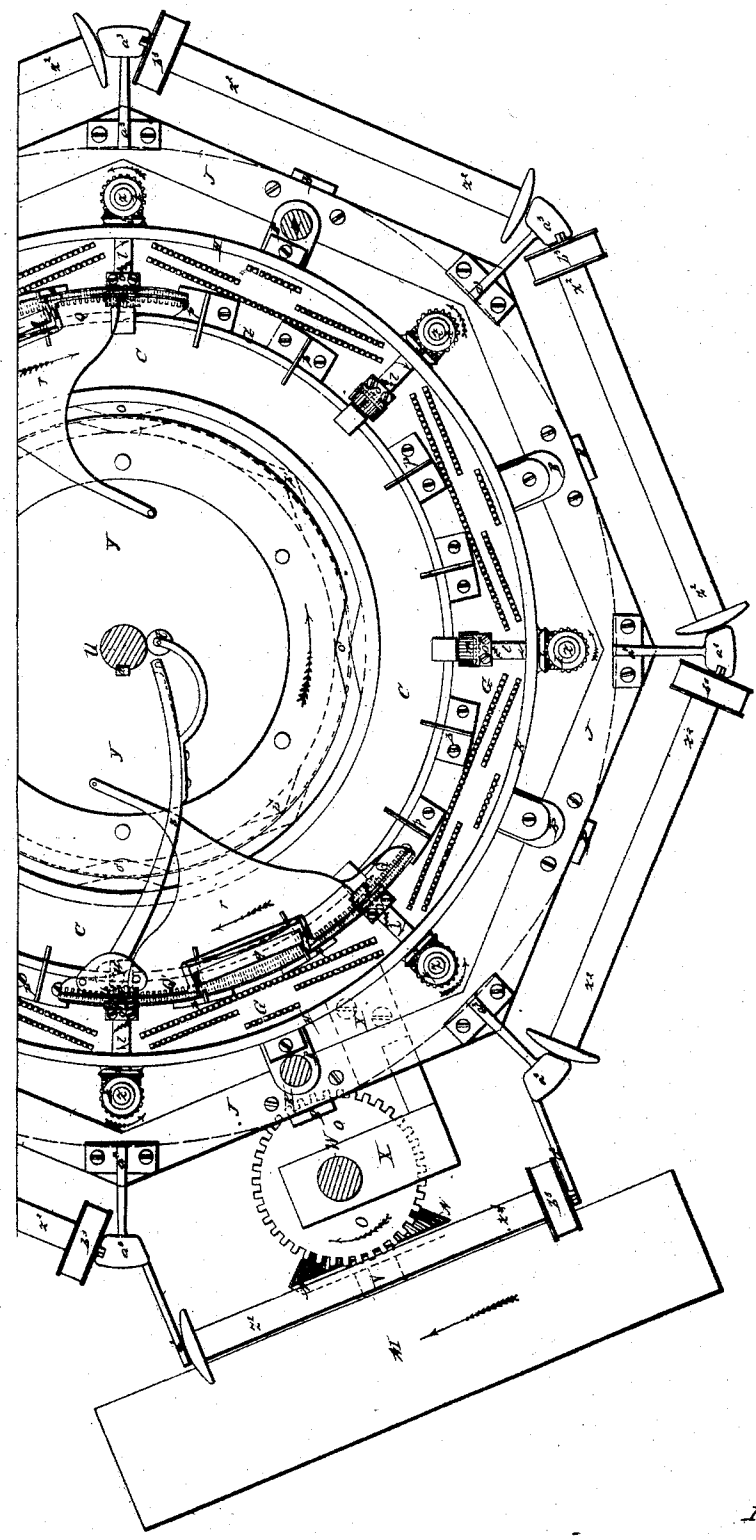


Fig. 1.

Witnesses:

J. B. Stapp

Ben. M. Fox.

Inventor:

N. B. Carney

Sheet 2 - 3 Sheets.

N. B. Carney.

Circular Power Loom.

No. 17,353. Patented May 19, 1857.

Fig. 2.

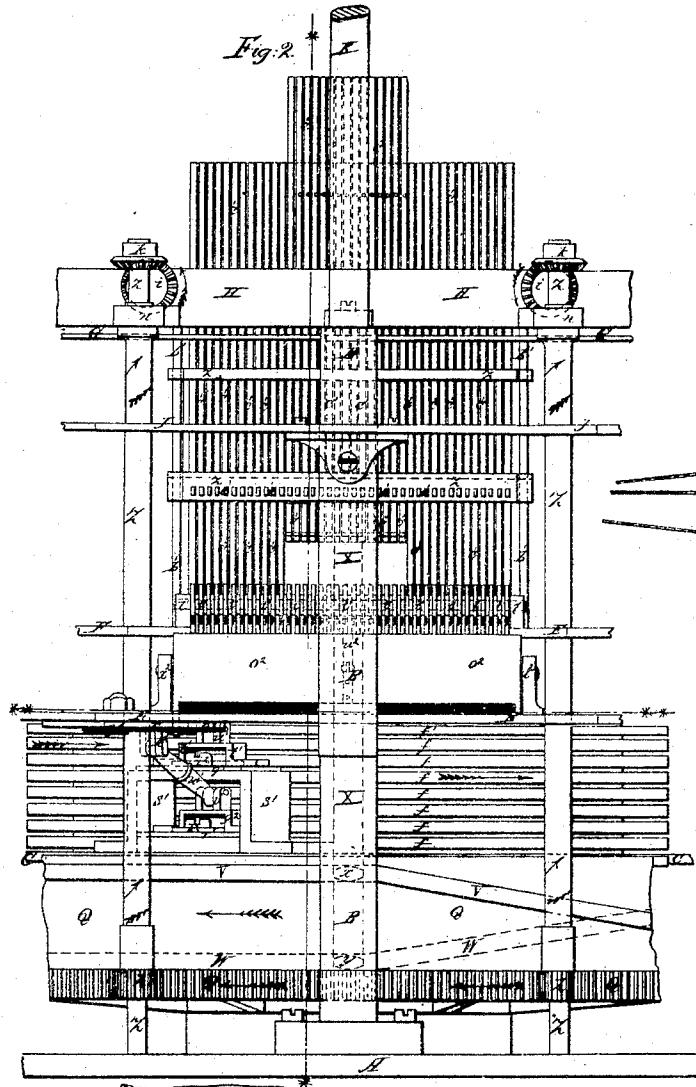


Fig. 6.

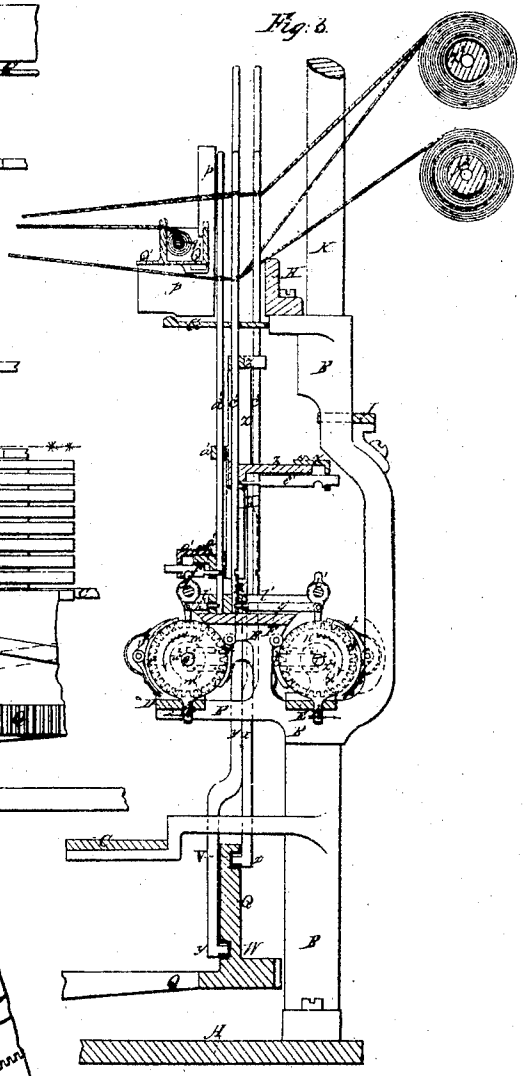
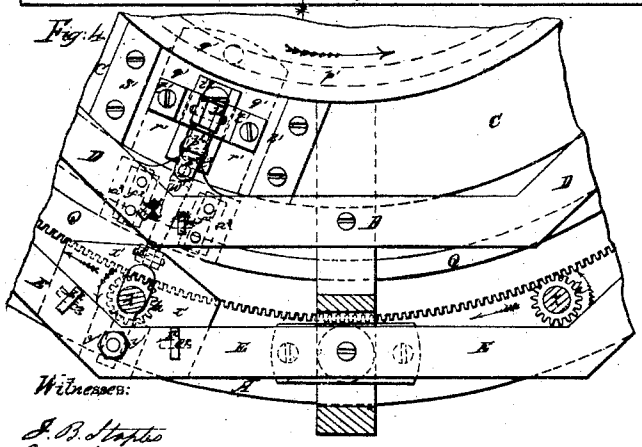


Fig. 4.



Witnesses:

J. B. Staples

Geo. W. Fox

Inventor:

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Sheet 3 - 3 Sheets.

Circular Power Loom.

No. 17,353.

Patented May 19, 1857.

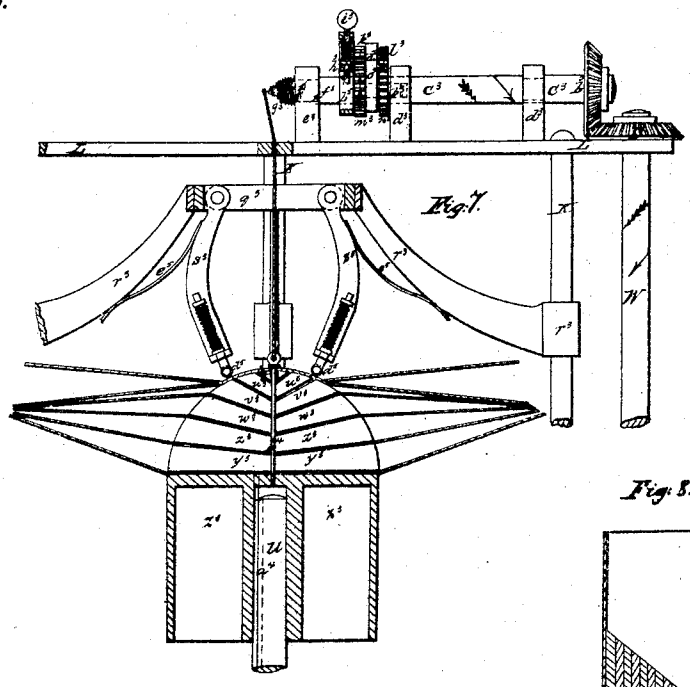


Fig. 7.

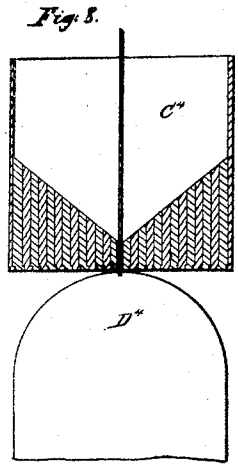


Fig. 8.

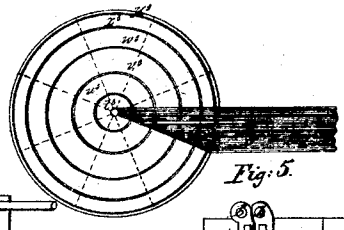


Fig. 5.

Fig. 6.

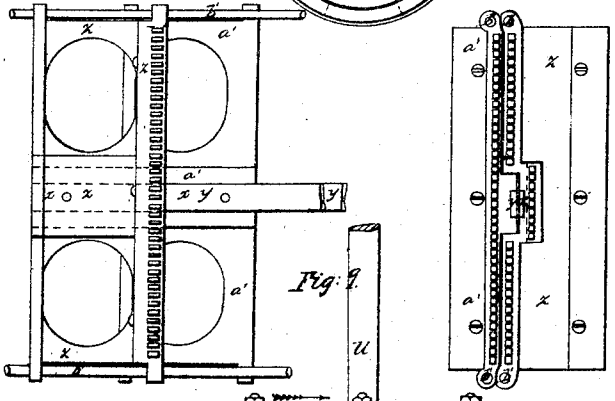
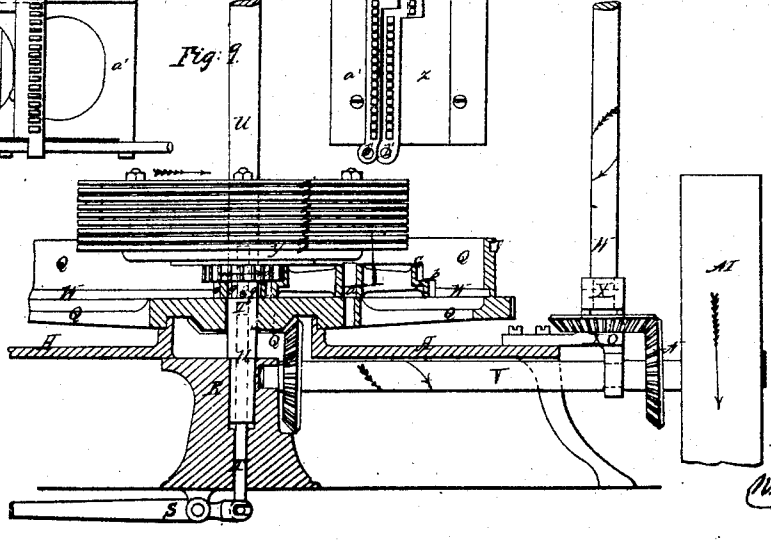


Fig. 9.



Witnesses:

J. B. Stokes

Geo. W. Fox.

Inventor.

W. B. Carney

UNITED STATES PATENT OFFICE.

NATHANIEL B. CARNEY, OF NEW YORK, N. Y., ASSIGNOR TO I. R LIVINGSTON, CHAS. H. HASWELL, AND RUSSELL C. ROOT, TRUSTEES, ALL OF NEW YORK, N. Y.

LOOM.

Specification of Letters Patent No. 17,353, dated May 19, 1857.

To all whom it may concern:

Be it known that I, NATHANIEL B. CARNEY, of the city, county, and State of New York, have invented certain new and useful improvements in machinery for weaving fabrics whether plain and of the usual forms and shapes or of shapes and forms hitherto not produced by weaving, such as cylindrical, conical, or irregular or other shapes, and which invention and improvement I call a "Circular Power-Loom;" and I do hereby declare that the following is a full and exact description of my said invention or loom, reference being had to the drawings accompanying the specification and making part thereof and to the letters of reference marked thereon.

Figure I, represents a plan of the loom. Fig. II, is a side elevation of one side of the same, the whole machine being composed of eight sides which are substantially alike. Fig. III, is a section of Fig. II upon the line marked *. Fig. IV, is a plan in section of the same upon the line marked * *. Figs. V and VI, represent plan and elevation of sliding frames, which form part of the mechanism. Fig. VII, being together with the following figures one half size of the foregoing figures represents, partly in section an elevation of the upper framing containing the form into which the fabric is to be woven and apparatus intended to press the fabric against the form. Fig. VIII, also represents a mode of pressing the fabric to the form. Fig. IX, is a section of the lower part of the apparatus intended to show the modes adopted for transmitting motion from the driving pulley.

Similar letters of reference indicate corresponding parts in each of the several figures.

A represents the strong cast iron bed plate of the machine.

B B, &c., are eight brass or composition metal columns firmly bolted to the bed plate, which support the transverse and also the upper framing of the machine.

C, D, E, F, G, H, and J, comprise the transverse framing and all the parts are severally fitted and bolted into projected bearings of the columns B, each frame passing fully around the loom, and having part in the office of supporting the mechanism.

K, K, K, K, are four columns which are prolongations of the eight columns B supporting the upper iron framing L, which is riveted firmly to the upper extremity of these columns.

Pulley M which gives motion to the different parts of the mechanism is keyed firmly to the shaft V which revolves in bearing X which is bolted to the bed plate A and also column R which latter is cast in one piece with the bed plate. This shaft carries the miter wheels N and P the first giving motion to miter wheel O keyed to the spindle W, and the latter to miter wheel Q, which forms a part and is cast in one with the large spur and grooved wheel Q. Spur wheel Q is fitted and turns freely upon a projection cast on the bed plate, and is furthur guided centrally by the stationary column U, which is fitted to and firmly held within R. A projecting part of the boss of the spur wheel Q carries the pin *d* which is fitted firmly into Q upon which are fitted and turn freely the two spur wheels *b*, 60 teeth, and *c*, 60 teeth, which are cast together in one piece and gear into pinions *d* 30 teeth, and *e*, 20 teeth, which latter are independent of each other, *e* turning freely upon spindle U, and *d* forming a part and being firmly fitted to the bottom of the eccentrics Y. Pinion *e* is operated upon by mechanism which enables it either to turn freely upon the spindle U, or to be held firmly upon it without motion, U, being stationary. This is effected by spindle T which fits and may be moved freely within U operated upon by lever S, which takes hold of T by means of a pin and groove, the pin being fitted tightly into the end of spindle T. The upper part of T is slotted to allow a key *g* to move freely within it transversely, it also carries a pin which passes through T at right angles to the slot, fitting into an oblique groove of the key *g*. *g* also fits into a groove of column U the height of the key and groove being adapted to the width of pinion *e* from which it may be disengaged by a downward motion of the lever S which thrusts the spindle upward disengaging the key from the pinion *e*.

The large spur wheel Q gears into eight pinions *h*, which are fitted and keyed upon the lower ends of spindles L, located at the corners of the eight sides of the machine; the lower end of these spindles fits and turns into bearings of bottom plate A and their upper ends revolve in bearings *n* formed by

projections of H above which is fitted to them the miter wheel K gearing into *i;* eight miter wheels *i* are keyed to the end of spindle *l*, which spindle has its bearing within *h* and *o*. The opposite ends of spindles *l* carry pinions *m* each one of them being arranged equidistant from the other and all being of the same size and revolving with the same velocity. These several pinions gear into corresponding teeth, with which the two shuttles Q′ are provided at their under side, the proportions of the gearing from the spur wheel Q to the shuttles Q′ being such that both make exactly the same number of revolutions, the shuttles also being of sufficient length to be always operated upon by the next pinion before leaving the former; the shuttle is guided in its path by a number of guards *p*, which are bolted to the framing G, the shuttles are also provided with a box to carry the filling rollers *q*. Each shuttle has a sheet iron guide *r* attached to it pointing toward the center of the loom having a hole in its end for the purpose of distributing the filling to the shape or form; in place of this latter contrivance or guide *r*, the finger *s* may be employed, which is movable upon center *w*, where it is acted upon by a spiral spring tending to press it toward the center column U or toward the shape or form when put on the center column U; the filling passes through a hole in the end of this finger and it is also provided with a separate arm holding a roller *t* which assists in parting the shades and in pressing up the filling. The wheel Q is provided with grooves V and W which cross each other twice at the circumference of the wheel, operating upon the connecting rods X and Y which fit with their ends by means of projecting teeth within these grooves and are made to exchange position twice during one revolution of the wheel Q, the duration of the upper and lower position being equal as the grooves are equal in figure and length. The upper ends of connecting rods X and Y carry the wire frames *z* and *a′* which are held in their position and guided in their motion by columns *b′* the ends of which are fitted into and held by the stationary framing F and G. The lower part of both wire frames is constructed so as to be capable of receiving a number of small steel slides *e′* and *f′*, these slides moving in the direction of their length; the end pointing toward the wires *c′* and *d′* is so shaped as to fit into corresponding grooves within the wires; unto the stationary framing F is bolted the plate *l′ l′* which is provided with bearings for pins which pass through the fulcrums of the levers *i′* and *k′;* the upper part of these levers fit into notches of slides *e′* and *f′* if brought into contact with the same; the lower ends of these levers carry or have pinned to them the flattened wires *g′* and *h′*, the ends of which fit into holes of plate *l′* and also into grooves of the wires *c′*, *d′;* the lower extremity of levers *i′* and *k′* is acted upon by rollers *n′* and *m′*, and the number of the levers is equal to the number of slides *e′* and *f′* and wires *c′* and *d′*. The upper end of the wires *c′* and *d′* is guided in square holes in part G of the stationary framing which corresponds to size and position of the wires. The eight eccentrics *f* upon the plate Y (the plate itself being grooved to form one eccentric) are together with the cover *f′* held firmly together by six wrought iron studs tapped into Y and provided at their upper extremity with nuts which bear lightly upon *f′*. The eccentrics *f* act by their ececntric part *o′* and *p′* upon the slides *g′* and *r′*, one pair of slides acting upon two pairs of rollers belonging to two of the eight sides of the loom; the lower slide *r′* which is moved outwardly by the eccentric part *p′* of one of the grooves within *f*, acting upon the pin on the end of the slide, is held in its position by set-screws pressing upon the plate *h* toward the stationary framing *c;* to the slide *r′* is bolted the clamp q^2 which carries on its top the joint *v′* taking hold of connecting rod *w;* the opposite end of the connecting rod takes hold of the joint k^2 which projects below the ends of the slides *x;* this slide is pressed toward the stationary framing E by plate Y′ provided with slots c^2 above which are slots b^2 in the framing E, through which projects pin n^2 which forms part of the roller cover o^2. The upper slide *q′* which is moved inwardly by the eccentric part *o′* of one of the grooves within *f*, acting upon the pin on the end of the slide *q′* is held in its position by set screws pressing upon the plate i^2 toward the stationary framing *s′;* to the slide *q′* is bolted the clamp *t′* which carries on its top the joint *u′* taking hold of the end of connecting rod p^2 which joints with its opposite end to slide a^2; the slide a^2 is pressed toward the stationary framing D by the two plates f^2 f^2 which are bolted to the stationary framing D. The plate a^2 is provided with slots e^2 above which are slots d^2 in the framing D through which project pins m^2, which form part of the roller cover i^2. The roller covers o^2 and i^2 are so constructed as fully to cover the sides of the rollers and part of the circumference; the sides of the covers are provided with slots to enable them to pass over the wrought iron spindles q^2 and r^2 upon which the rollers are fitted; the part of the slot which projects beyond the spindles is again covered with sheet iron, riveted or bolted to the cover; the ends of spindles q^2 and r^2 fit into bearing w^2 and x^2 which are fastened to the stationary framing D and E. The rollers *m′* and *n′*

are grooved around their circumference. The projections being partly removed as circumstances may require, though at about the width of the length of the rollers the teeth are always left unremoved; at this part of the rollers the catches n^2 and t^2, s^2 and v^2 take each hold of one tooth at the circumference.

The catches u^2 and v^2 are jointed to the roller covers o^2 and i^2, being pressed by springs toward the rollers, both slipping the teeth of the rollers if moved in opposite directions as indicated by arrows. The catches t^2 and s^2 which are also pressed by springs toward the rollers are jointed to a part of the column B, slipping the teeth of the roller if the latter move in the direction indicated by the arrows, but preventing the rotation of the rollers in the opposite direction. The warp upon beams y^2 and x^2 passes through holes near the top of the wires o' and d' from where it passes to the form upon which the fabric is woven; the ends of the beams have their bearing in the standards a^3 which are firmly bolted to the stationary framing J; each beam is provided with a pulley b^3 for the purpose of suspending a cord with a counterweight to provide tension for the warp.

Spindle W which has its lower bearing in X and its upper bearing in framing L, has the miter wheel b^3 keyed to its upper end gearing into b^5 and transmitting motion to the spindle c^3 which has its bearings in d^3, d^3, which bearings are supported by framing L. The end of spindle c^3 carries a small crank o^3 which may be forged in one piece with the same; this end of the spindle is hollow to receive p^3 one journal of the spindle f^3. The spur wheel n^3, 45 teeth, which is fitted upon spindle c^3 so as to allow the spindle to revolve within, is bolted or otherwise fastened to the bearing d^3, and is therefore stationary; it gears into pinion e^3, 18 teeth, keyed to spindle a^5 which revolves within o^3, having another pinion k^3, 18 teeth keyed to its other end; r^3 gears into spur wheel m^3, 46 teeth, which has a lengthened hub b fitted into spindle f^3; b^5 is surrounded by a wrought iron yoke, which is extended to the form of a crank to receive the pin c^5; the pin also traverses hub b^5, and fits into a hole within spindle f^3 being wrought at its other end into a handle i^3, bearing also a small washer, upon which presses a spiral spring tending to press the pin c^5 into the hole of the spindle f^3, by pulling the handle i^3, spur wheel m^3 is disengaged from the spindle f^3 and the latter left free to revolve. Spindle f^3 which has its journals within spindle c^3 and bearing d^3 ends into a fusee or taper thread g^3 taking hold of a cord supporting the shape or form upon which the fabric is woven. The shape represented is a semisphere ending in a cylinder; the sphere is composed of a number of sections, t^3, u^3, v^3, w^3, x^3, y^3, of metal which rest upon the metal cylinder Z^3, which has a central hole into which fits the column U provided with a key a^4, fitting into a corresponding key seat, the whole being so fitted as to allow the cylinder to slide freely, upon the column. Between each two of the sections of the sphere or at their joining circumference are locked in as many threads as require to be introduced from the last to the following section, represented in plan at F^4 showing the number of threads necessary for about one half section; the first threads are introduced at the center, and held by the bolt b^4 which is tapped into the top of cylinder Z^3, and provided with an eye, to receive the cord which sustains the shape or form. The fabric when being woven is pressed toward the shape by rollers d^5 which may be increased in number to ten, or more; the shafts of the rollers are pressed by spiral springs toward the shape and restrained by a projecting collar of arms s^3 by which they are also supported. The arms s^3 have their fulcrums within the ring g^3 supported by brackets r^3, which slide and are fastened upon the four columns k. Upon each arm s^3 rests a spring e^5, pressing rollers d^5, toward the center of the form; by the gradual raising of the form, the rollers recede from the center of the form, following the shape of the sphere, resting, and gently pressing upon the fabric. Another contrivance designed to press the fabric toward the form consists of a cylinder c^4, the inside diameter of which is equal to the inside diameter of the fabric, which is represented by D^4; within the large cylinder and gradually decreasing in diameter, are a number of smaller cylinders, which are fitted so as to slide freely within one another, a small offset; on the end of each of the cylinders, enables them to support each other downward, but the raising of the fabric D^4, gradually forming upon the shape raises the cylinders in succession as they come in contact with the fabric, and so insures close contact of the fabric to the form during the progress of weaving. The cylinder c^4, if employed is supported like g^3, by brackets r^3.

The movements of the various mechanisms of the circular power loom are supplied by a single pulley M revolving spindle V in the direction indicated by the arrows and giving motion through miter wheels P, Q, and N, O, to the large spur and grooved wheel Q and spindle W, the spur wheel Q and spindle W, will therefore make the same number of revolutions as pulley M; Q gears into the eight pinions h, revolving the spindles Z in the direction indicated by arrows. The upper extremity of spindles

Z carry miter wheels k which gear into i, revolving the spindles l, which carry the pinions m in the direction indicated by arrows, pinions m taking hold of the two shuttles Q′. The shuttles Q′ rotate in the direction indicated by arrows, and in opposite direction to the spur wheel Q, but at a velocity exactly corresponding to that of the spur wheel, making both the same number of revolutions in a given time.

Spur wheels e, b, c, d; e being stationary upon spindle U, b, and c revolving together upon a spindle a which is stationary in spur wheel Q, and d forming part of y, the lower plate of the eccentrics f, revolving freely upon spindle U; by the relative proportion of number of teeth the eccentrics f revolve once at three revolutions of the spur wheel Q. The wheel Q in its cylindrical projection provided with grooves V and W, takes hold of the ends of connecting rods X and Y attached to wire frames z and a', which are made to exchange position twice during one revolution of wheel Q, the duration of the upper and lower positions being equal, as the grooves are equal in figure and length. The slides q' and r' acted upon by eccentrics f are connected by connecting rods w' and p^2 to the slides x' and a^2, which take hold of the projecting pins m^2 and n^2 of the roller covers i^2 and o^2. The pins m^2 and n^2 in the moment they are operated upon by the slides a^2 and x', are moved together with the roller cover around the two axles q^2 and r^2, in the direction indicated by arrows near the end, of the pins; the rollers during that part of the motion are retained in their position by the catches s^2 and t^2, the catches u^2 and v^2 at the same time slipping one tooth of the rollers. In the moment the pins m^2, n^2, are beginning to move in the opposite direction to that indicated by the arrows near the end of the pins, the catches s^2, and t^2 release their hold upon the teeth of the rollers, acting upon the end of the levers k' and i', the pins g', and h', are withdrawn from the wires c', and d', and the slides f' and e' are at the same time moved toward the wires projecting their ends into corresponding grooves of the wires, thus locking the wires into the sliding frames a' and z, and therefore if the tooth is left unremoved upon the whole length of the roller all the wires will be locked into the sliding frames a' and z, and the whole warp brought into action on the next raising of the sliding frame, but if the tooth is partly removed such parts will be unable to act upon levers k' and i', and the corresponding wires remain locked in the stationary plate l', the sliding frames rising without those wires, leaving the warp passing through holes in their upper ends, below the revolving shuttles Q′ Q′ or out of action.

The pins m^2 and n^2 acted upon through slides by the eccentrics f, are moved to and fro once at three revolutions of the grooved wheel Q, at the time when the frames are in their lower position. The proportion of three to one which is here adopted may be varied at pleasure and is governed by the shape of the fabric, or by the length of time the number of threads constituting the shades may remain unchanged. The chnges of position of the wire frames are always effected in advance of the passing of the shuttles. Spindle W, which revolves in the direction indicated by arrow, gives motion to spindle c^3 through miter wheels b^3 and b^5 carrying on a small spindle passing its cranked extremity o^3, pinions k^3, and l^3, giving motion to spur wheel m^3, (spur wheel m^3 being stationary) and also to spindle f^3 to which it is locked by pin c^5; at the rate of 124 to 1, or spindle f^3 makes 1 revolution if spindle c^3 makes 124 revolutions, this slow motion being necessary for the gradual raising of the shape or form z^3 upon which the fabric is woven; for to further proportion and modify the velocity for raising the shape, the end of spindle f^3 is turned into a taper fusee, the cord for raising the shape being fastened to the extremity. The effect produced is that the first revolutions of spindle f^3 will but very slightly raise the form, the speed gradually increasing during the progress of the weaving; the exact shape of the fusee being always proportioned to the shape of the fabric and the thickness of the filling.

For the purpose of always keeping the warp threads in place and preventing entanglement of the threads the wires holding the warp should be prolonged upward above the eye through which the threads pass so far that their upper extremities shall always be above the line of the warps. The gearing of the shuttle may be so raised that the teeth by which it is geared and driven may be upon the outside of the periphery or arc of the shuttle instead of underneath, as represented in the drawing, which would require a corresponding change in the spindle and pinions which connect with and operate into the teeth of the shuttle, although by the plan shown in the drawings, and the grooves in Q and their connections, only two shuttles can be operated with, it is to be observed that by increasing the number of times that the eccentric grooves in Q cross each other, and the corresponding connections, and increasing the size of the machine a greater number of shuttles may be used than two. The number of grooves upon Q may be increased so as to have additional sets of warps inside and outside, when it is desirable to have different colors in the warps.

In making the shuttle V which has the peculiar form nearly resembling a section of the circle in which it moves, I take a plate

or disk of metal of the exact circle, around which the shuttle has to move, and divide it into sections from the center—these sections will constitute the general outline or shape of the shuttle and by marking upon the plate or disk the exact number of teeth upon the spur of Q, the number and size of the teeth upon the shuttle will be easily obtained.

In preparing for the operation of weaving, the warp threads being inserted as above described such portion of the warp wires are brought into operation by the rollers and pins as may be required for the shape of the fabric, the ends of the filling threads carried through the end of the finger of the shuttle are tied together, and upon the power being applied, the shuttles are set in motion, the warp wires and their thread separate to receive them between the sets of the threads. The filling is carried to and begun at the center of the loom, and the operation of weaving is thus commenced.

For the insertion of the pins into the rollers for producing the pattern desired upon the cloth the following rule may be observed. I first count upon the squares of the cloth made by the weft and warp the number of warp threads that will fall within that part of the pattern which it is desired to put upon the roller, the pins are then inserted into the roller so as to act upon the warp wires which hold the warps which fall within that portion of the pattern desired; the next portion of the pattern which falls upon the next series of squares is then taken and the corresponding number of pins is inserted into the roller so that the next change in the movement of the roller will bring these pins into action upon the set of warp wires last mentioned, and this process is carried on until the pattern desired is completed upon the roller by the insertion of the pin.

Having thus described my said improvements and invention and manner of operating the same, what I claim as my invention and desire to secure by Letters Patent, is—

1. The weaving of fabrics within and upon a circular frame, or looms arranged about a common center, producing the fabric at the central part, the shuttles being carried in a circle around the frame, or loom, in a continuous movement, the warps shuttles and filling being placed at the top of the loom, and the machinery for operating acting underneath, the weaving being effected by machinery as above described.

2. I claim the combination and arrangement of the machinery above described acted upon and driven by the spur, wheel Q—and its eccentric grooves and their connections, by which the sliding frames holding the warp wires or heddles are caused to reciprocate in opposite directions in equal times and regular succession, and the shuttles are made to rotate about the circumference of the loom in a plane perpendicular to the planes of motion of the sliding frames, and in equal times so as to pass between the upper and lower sets of warp threads when apart, thus producing a fabric at the central point.

3. I claim the combination of the roller-covers and barrels operating together as described.

4. I claim the combination and arrangement or mechanism of the flat wheels or disks with their grooves with eccentrics the cams and connecting rods and slides, the roller covers, the levers, bolts and slides, the levers carrying a motion from the rollers and covers to the warp wires so as to hold them fast or set them free to move with the frames, the whole operating in conformity with Q and its connections, thereby regulating the pattern, shape, or figure of the fabric to be woven.

5. I claim the giving to the shuttle the same continuous line of motion without any divergence, thus avoiding the danger of injuring the operator or the fabric, from an accidental false direction of the shuttle.

6. I claim the form and construction of the shuttle Q′ *r*, as described, having its teeth on the under side or outside of its arc, and also the shuttle Q, *s*, constructed so as to adapt itself to the increasing growth of the fabric and pressing up the filling, as described.

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Witnesses:
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G. W. FOX.