Sheet 1-2 Sheets.

M. Bretzger.

Weaving Wire.

No. 4,873. Patented Dec. 5, 1846.

Fig. 1.

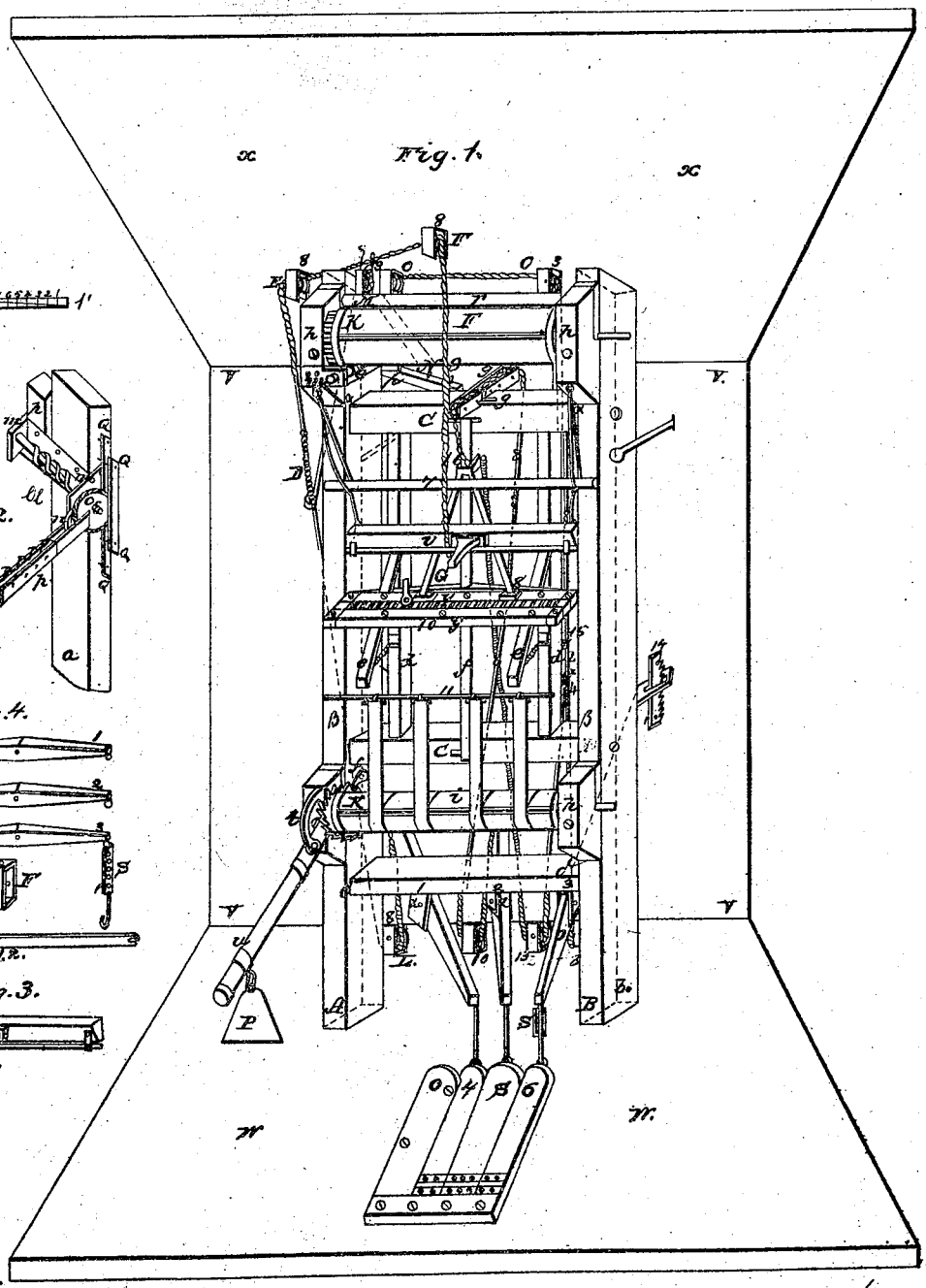

Fig. 2.

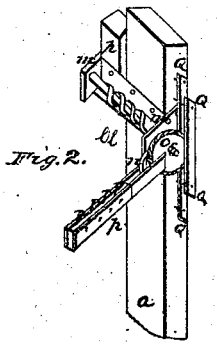

Fig. 4.

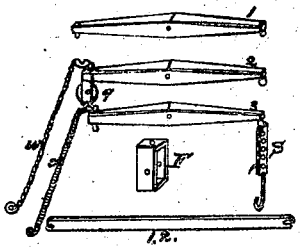

Fig. 3.

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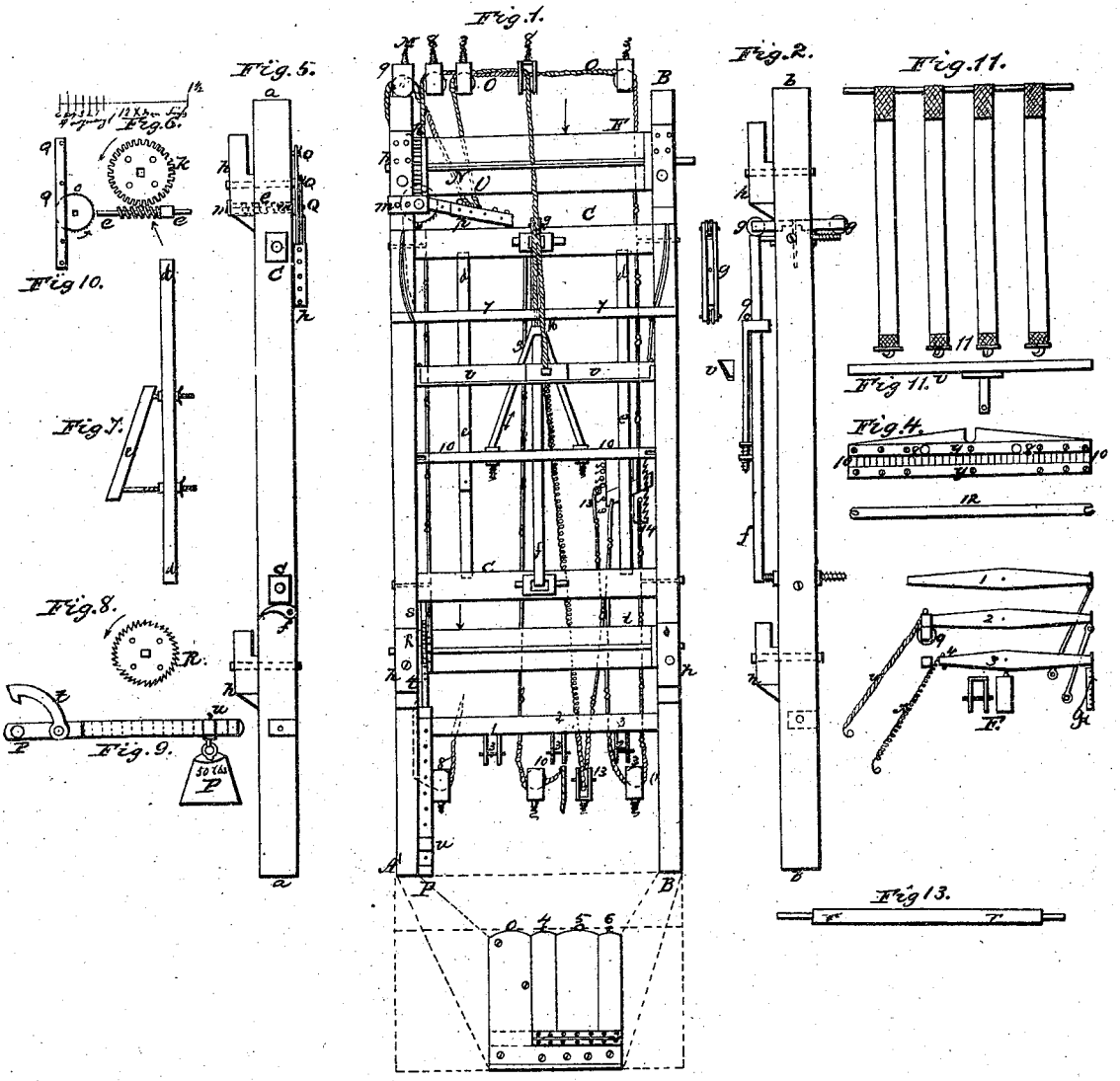

Witnesses.
C. Grieselberg
R. Abel

Inventor.
Adolphus Bretzger

UNITED STATES PATENT OFFICE.

MELCHIOR BRETZGER, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN LOOMS FOR WEAVING WIRE-GAUZE.

Specification forming part of Letters Patent No. **4,873**, dated December 5, 1846.

To all whom it may concern:

Be it known that I, MELCHIOR BRETZGER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented an Improvement in Looms for Weaving Wire Gauze, of which the following is a specification.

The loom consists of the following parts:

First. A strong basis about three or four feet square, of from three or four inch planks, joined together in such manner as the maker prefers, so that it be strong. (See Table II, Figure I, W W.)

Second. At the back of this basis erect a perpendicular wall of the width of the basis, and right-angular to it, of boards one inch or more thick and from eight to nine feet high. (See Table II, V V V V.)

Third. About one foot from this wall, and parallel to it, place and fasten into the basis V V V V two perpendicular posts, A A and B B, of strong wood, of three by six inches size, and as high as the above-described wall, about thirty-two inches apart from one another. (See Table I, Fig. I, and Table II, Fig. I, A and B.) Whenever the loom can be placed in a room with a sufficiently strong floor and low and strong ceiling and strong wall, the posts A A and B B may be fastened into the floor and ceiling a foot from the wall, and in either case the loom may be further steadied by any means the builder may prefer. There is a variety of them not requiring description.

Fourth. On the top of said wall V V V V and the posts A and B, as above described, put a cover or lid made of like boards as the wall V V, &c., and fasten it to them with nails, screws, or otherwise. (Table II, Fig. I, X X.)

Fifth. At the points $\alpha\ \alpha$ and $\beta\ \beta$ join and strengthen the posts A and B by two horizontal wooden cross-bars, C and *c*, Tables I and II, Fig. I, C *c*, and at the point *d d* fasten into said posts A and B the cross-bar 1 2 3, under which the levers 1 2 3 are suspended.

Sixth. On the front part of the posts A and B, at the points *h h* near the top and *h h* near the foot of the loom, fix strong wooden knobs (with screws, pins, or otherwise) with notches in them, as seen in Tables I and II, Fig. I, *h h* and *h h*, and Table I, Fig. V, *h h*.

Seventh. Parallel with A and B run perpendicularly the three-inch-thick wooden bars *d f* and *d* from C to *c*; Tables I and II, Fig. I, *d f* and *d*, let into the cross-bars C and *c*. The bar *d* is to be about three inches from the post B; the bar *d f* three inches from post A and as much more as the rack-wheel K is thick. On the front of each of these bars *d f* and *d* is fastened lengthwise, slanting forward, with screws, an iron or other metallic bar three inches broad and one inch thick, *e* and *e*, and of sufficient length, and well polished, for the sley to slide up and down upon. The screws are attached at right angles, one at each end of the said bars, and must be such as will serve to draw either one or both ends of them nearer to or farther off the bars *d f* and *d*, to which they are attached, and thereby to put them into a more or less slanting position, as may be required. (Table I, Fig. VII, *e*, and Table II, Fig. I, *e* and *e*.)

Eighth. The cross-bar *g*, Table II, Fig. I, and Table I, Fig. II, *g g*, consists of a piece of wood three by three inches thick and twelve inches long, forked at both its ends, with a wheel in each fork, turning vertically. This bar may be strengthened by tin or iron on two sides, and is fastened upon and across the middle of the bar C, so that one wheel projects on each side—in front and back of said bar C.

Ninth. The iron bar *f*, round, from one to one and a half inch thick, runs from the middle of the bar C perpendicularly to the bar *c*. To its ends are screws attached at right angles, which pass through the bars C and *c*, by which screws the bar *f* may be drawn nearer to or farther off from the bars C and *c*, whereby it may be put into a more or less slanting position, like the above-described bars *e e*, with which it must incline in the same degree. Against these three bars *e*, *e*, and *f* the sley 10, Table II, Fig. I, is made to lean, and to slide up and down upon.

Tenth. The cylinder *i i*, Tables I and II, Fig. I, is made of wood, similar to those of other looms, from seven to eight inches in diameter, and turns on its axis in the notches of the nobs *h h*. At its one end, to the left, it has a dented wheel, R, vertically attached to it, the axis of the cylinder passing through the center of said wheel, the diameter of which is so much greater than that of the cylinder that its teeth project beyond the circumfer-

ence of the latter, or more, if thought requisite. The wheel R is one-half of an inch thick. Just above the wheel R is a catch fixed to the post A, Table I, Fig. V, S and Table II, Fig. I, S *x x*. From the wheel R to the other end of the cylinder *i i* runs along the entire length of it a groove about one inch deep and wide. The lever P, Table I, Fig. IX, and Table II, Fig. I, is about twenty-five inches long, fifteen inches of which are wood two or three inches thick, and ten inches of iron one-half of an inch thick and two or more inches high, (or broad,) with a hole through its end, through which the axis of the cylinder passes, so that the lever rests on it as on its pivot between the post A and the wheel R. Where the iron of this lever is attached to the wood part of it fasten a round iron hook, *t*, one-half by one inch thick and long enough to reach between the teeth of the wheel R with a pin or screw, so as to move with ease. (Table II, Fig. I, and Table I, Fig. IX, *t*.) The back of this lever is notched, and a weight, P *u*, by a ring or hook hung upon it. (Table I, Fig. IX, and Table II, Fig. I.) P, the lever; P *u*, the weight; *t*, the hook; R, the dented wheel; S *x x*, the catch.

Eleventh. The cylinder I I, Table I, Fig. I, and Table II, Fig. I, is made like cylinder *i i*, but that it has at its one end, to the left, an iron rack-wheel, K, of the same diameter as the cylinder vertically attached to it, the axis of the former passing through the center of the latter. It has likewise a groove, like cylinder *i i*. The rack-wheel K is from one-half to an inch thick. The end of the axis of this cylinder I I, to the right, is so made that a crank may be put on it to turn the cylinder with.

Twelfth. The cylinder *r*, Table I, Fig. XIII, and Table II, Fig. I, is of wood or iron, of sufficient weight to press thereby the wire of the chain smoothly on the cylinder I I when being put on. It is laid upon the cylinder I I when the chain is being wound upon it, and turns in the same notches as it.

Thirteenth. The endless screw *l l* is horizontally attached on the inner side of the post A A, just underneath the rack-wheel K, so as to catch in the teeth of the latter. It turns on its axis, the ends of which rest in the holes of a piece of wood or metal attached in front and back of post A, as seen in Plate I, Fig. I, at *m*, and in Plate II, Figs. II and I, at *m m*. On that axis, which, when thus affixed, extends back of the post A A, put a dented wheel, *o*, Table I, Fig. X, and Table II, Fig. II, by passing said axis through its center. This wheel *o* is from six to seven inches in diameter and one-fourth of an inch thick, and has about six teeth to each inch of the circumference. On the back of post A, as high as the wheel *o*, screw flat against said post and perpendicular an iron spring, by both its ends Q Q, and another such flat upon the latter, Table I, Fig. V, and Table II, Fig. II, tight enough to hold the wheel *o* (a segment of which, of about one-third of it, passes between said springs) fast and steady, and to prevent it from slipping back after being turned by the lever *p*, Tables I and II, Fig. I, and Table II, Fig. II, also Table I, Fig. X. This lever *p*, Table I, Fig. I, and Table II, Figs. I and II, is about fifteen inches long, and consists of a piece of wood one inch thick and two or three inches broad, lined on both sides with strips of iron one-eighth of an inch thick or more, which project at its one end about four inches beyond the wood, so as to form a fork. Where this fork begins an iron catch, *n*, Table II, Fig. II, is attached to the wood, which reaches between and catches in the teeth of the wheel *o*, the axis of the endless screw *l l* passing through the center of said wheel *o*, passes also through the end of the fork of the lever *p*, so as to place the wheel *o* between the blades of the fork, and the said catch *n* between the teeth of the wheel *o*. Along the back of said lever *p* are some five or six hooks at equal distances from one another.

Fourteenth. The gear consists of a metal bar, in length equal to the width of the loom between the posts A and B. It resembles in shape a razor-blade placed on its edge, and when put into the same position the two ends of this bar present the shape of a trapezium, thus  , Plate II, Figs. I and III, and Table I, Fig. XIV, *v*, the upper part of which I shall call the "top," one inch thick. The side which forms a right angle with the top is its "back," about two or three inches deep or broad. The side which forms an acute angle with the top is its "front," a little deeper than the back, the part opposite to the top its edge, one-fourth of an inch thick. From the middle of the front of the gear or bar *v* projects at right angles a pin about six inches long, thereon to fasten a cord, Table II, Fig. I, G. Along the edge of this bar passes a wire or rod as thick as the edge, bent at its ends at right angles and upward. By these two ends thus bent and made square, screw this wire or rod to the ends of said bar, so as to bring it underneath the latter, and fasten the wire or rod along the edge with three or four small pins at equal distances, and leave between the wire or rod and the bar sufficient room for the largest sized wire of the web to pass between. (Table II, Fig. III.) To this wire or rod thus fixed you attach loops, which extend about one inch right-angularly under and back of the gear. Make the loops of the same wire, in every case, the web is made of, in number equal to the number of wires in the back part of the chain, (or to one-half of the whole number of wires in the whole chain,) and as far apart from one another as the same, since they must pass through these loops.

Fifteenth. A club or bar, 7, of wood, in length equal to the width of the loom, about two inches thick, and suspended by strings attached to the posts A and B, serves to part or keep apart the two divisions of the chain,

so that its wires pass alternately in front and back of it. (Table I, Fig. I, 7 7, and Table II, Fig. I, 7.)

Sixteenth. The sley, Table I, Figs. I and IV, 10, and Table II, Fig. I, 10, consists of a wooden or metallic frame, *y y*, (*ib.*,) about thirty-two inches long and one inch wide, with metallic reeds in it, tied with wire. It is thus far made like sleys used in other looms; but, besides this, the sley has two converging handles or arms attached to it right angularly, as seen in Table I, Fig. I, 10, and Table II, Fig. I, 10, at the points *z z*. These handles are about fourteen inches long, and are joined together in a point at their ends, and so notched at the back of this point where they are joined together as to receive the bar *f* in the notch. In front of this point, where they are joined, (*i. e.*, opposite to the notch, is a hook or ring to fasten a cord on. On the same side of the frame to which the handles or arms are attached fasten a strip of iron or other metal to it, so as to extend backward, and likewise right angular to said handles, about one inch broad, also with a notch for the same purpose as the above notch.

Seventeenth. The straps are made of leather four or five feet long and two or three inches broad, with an ear at one end and a hook at the other. (Table I, Fig. III, 11.) Four such straps are sufficient for both the cylinders I I and *i i*. Through the ears of the straps pass an iron rod that will fit into the groove of said cylinders, wherein it is fastened with pins, and with the hooks attach them to another such rod after putting the chain of the web on said rod. (Table I, Fig. III, 11, and Table II, Fig. I, 11.)

Eighteenth. The levers 1 2 3 are about eighteen inches or two feet long, of wood a few inches thick, with a hole horizontally through the center, and a hook on each end, or a ring instead. They are suspended under the bar 1 2 3, Tables I and II, Fig. I, in the same way as a wheel in a pulley. Lever 2 has a pulley on its back end.

Nineteenth. Five pulleys are fastened into the cover or lid of the loom, just back of the cylinder I I, the wheels of them being turned downward. (Table I, Fig. I, 3 3, 8 8, and 9. The same. Table II, Fig. I, 3 3, 8 8, and 9.) Four other pulleys are fastened int the basis, so that the wheels of them are turned upward, and a rope or cord may be passed underneath them. (Tables I and II, Fig. I, 8 10 13 3.)

Twentieth. The treadles are like those in other looms. (Tables I and II, 4 5 6.)

Twenty-first. At 15, Tables I and II, Fig. I, 15, are some six or more hooks, fastened one above another into the wall V V, &c., of the loom, about an inch or more apart.

Twenty-second. At 14, Tables I and II, 14, is an iron blade about one inch wide and twelve inches long, with teeth like a saw in it. It is attached to the wall.

Twenty-third. One cord, attached to the pin G in front of the gear *v*, passes from thence upward over the wheels in the two pulleys 8 8, under the cover X X of the loom, thence down to the basis W W of the loom and under the wheel in the pulley 8, and then upward to the back end of the lever 1. The front end of this lever 1 is connected by a cord with treadle 4. (See G F E D L, Table II, Fig. I.) At the point D this first-mentioned cord has some six or more rings an inch or so above one another. (See Table II, Fig. I, D.)

Twenty-fourth. Another cord is attached to one of the hooks on the back of the lever *p*, Table II, Fig. I, and passes thence over the wheel in pulley G, and is fastened with a hook at its end in one of the rings in the first-described cord at D, Table II, Fig. I, N M D. When this cord is put on a hook nearer to the end of the lever *p*, it will raise the same less high by one pull of the treadle 4; and when put on a hook farther off from the end of the lever, or nearer to the wheel *o*, it will raise it higher, and of course push the wheel *o* more or less around, as the lever *p* is lifted more or less high. Again, by putting the cord N M D, attached to one of the hooks of the lever *p*, with its own hook into a higher or lower ring, (in the other cord at D,) it is made more or less slack, and the more slack it is the less will it lift the lever *p*, and so vice versa. The cord G F E D L, being tied to lever 1, and the latter connected with treadle 4, and cord N M D being joined to the former at D, the lever *p* and gear *v* are acted upon by pressing down treadle 4, whereby two objects are gained: First, the gear *v* is so raised that it presses with its back against the front part of the chain, while the edge is drawn forward, and with it the loops and the wires passing through them, whereby the chain is made to cross. By letting go the treadle 4 the gear *v* drops into its first position, and so do the two divisions of the chain, so that they recross one another. Second, by pressing down the treadle 4 the lever *p* is lifted up, its tong or catch, Table II, Fig. II, *n*, catches in the teeth of the wheel *o* and pushes it forward. By doing so the endless screw *l l* is turned, which again catches in the teeth of the rack-wheel K of the cylinder and turns the latter forward. Thus by shortening or lengthening the cord N M D you may turn the cylinder I I any distance you choose, or which may be required for weaving webs of greater or smaller meshes; but the length of said cord being once fixed, the cylinder I I will be turned the same distance by every pull of the treadle until the cord's length is altered.

Twenty-fifth. Another cord, O O O O, is attached to one of the hooks or levers *p*, passing over the pulleys 3 3, down to the basis of the loom, then under pulley 3, and then up to the back end of lever 3. This back end of said lever 3 is hung up with a spiral spring, Table II, Fig. IV, *x*, against the wall of the loom V V, or otherwise, so as to keep the said lever in a horizontal position, and to make it descend gradually after being lifted by a pull of the treadle 6. The

front or rear end of lever 3 has an iron strip with some six or eight holes in it, above one another, and at the end of treadle 6 is a short cord with a hook at its end. By putting the said hook higher or lower in one of said holes, the connecting-cord between treadle 6 and lever 3 is made longer or shorter, and the shorter it is the greater will be the pull on the lever *p*, and the longer it is the less will be the pull on lever *p*, so that thereby you may regulate the distance you want to turn the cylinder I I. The last-mentioned cord, connecting the lever *p* with the treadle 6, being entirely disconnected with that attached to the gear *v v*, it turns the cylinder I I without lifting the gear, so that by pushing down treadle 6 you only turn cylinder I I; but by pushing down treadle 4 you turn cylinder I I and lift the gear *v v* at the same time. The endless screw turns said cylinder I I without jerking. Besides the spiral spring at the back end of the lever 3, there is a cord attached to it at the same point where the spring is fastened to it. At the other end this cord has a strip of iron with a slit in it large enough to pass the iron dented blade described in section 22 and seen on Plate II, Fig. I, 14, through it, and by putting this strip of iron higher or lower and fastening it in some of the teeth of the said described blade 14, thereby to lift the back end of lever 3 and prevent it from falling below a horizontal position, which would lift the treadle 6 higher than should be and cause a longer pull on lever P than required. By this cord the back end of lever 3 is lifted so high that the front part will not lift treadle 6 above the level of the other treadles, though the cord between treadle 6 and lever 3 be ever so short, so that by this cord the pull on the lever P and the distance the cylinder I I is to turn are entirely regulated and controlled.

Twenty-sixth. Another cord is tied to the arms of the sley at 16, (see Table II, Fig. I, 16,) passing upward and over the pulleys in the bar G G, then down back of the loom to and under the wheel 10 on the basis W W, thence upward and over the wheel at the end of lever 2 on the cross-bar 1 2 3, and thence to the basis, where it is fastened to a pin or ring. Lever 2 is like the other levers, 1 and 3. It is likewise lifted up into a horizontal position by a cord, *w*, Table II, lever 2, on its fore or back end, which cord is fastened against the wall V V V V of the loom; but it has a pulley on its back end, over which the cord from the sley-arms 16, section 26, described, passes. Instead of cords, you may use chains, except so far as they pass over pulleys, and by making these cords their proper lengths (which must be governed by the greater or lesser size of the meshes of the web) you may regulate the movement of the cylinder I I and also the rise and descent of the sley so as to fix the precise point where it is to strike the wire that the weaver passes between the chain.

Twenty-seventh. To make the sley, Tables I and II, 10, descend and strike with sufficient force against the wire passing in the course of weaving between the chain of the web, if its own weight should be insufficient for that purpose, you may attach a spiral spring to it at 16, with a cord at the end, which must pass under the wheel 13 on the basis W W, and thence upward to 15, where it is fastened to a hook or pin. This spiral spring may be drawn more or less tight, as you want it to pull with more or less force.

Combined practical operation: After the wire for the chain is arranged (as is done in cases of other looms) and ready to be put on the machine, the cylinder I I is lifted up by putting a piece of wood under its axes, high enough to prevent its rack-wheel K from touching the endless screw *l l*, and a crank is fixed to one of the axes of the cylinder I I. The wire of the chain is then fastened on the iron rod in the groove of the cylinder, and this bar pinned tight. Next an iron or other heavy cylinder of convenient size is placed above and on this cylinder, turning in the same notches with the latter. The cylinder I I then is turned by the crank. At the same time the cylinder above it presses against the wire as it is wound upon the cylinder I I, and makes it lie smooth and even. In this manner the chain is wound upon the cylinder I I until only so much remains as will reach below the sley 10. Then the chain is passed between the reeds of said sley and fastened to another iron bar or rod, like the one pinned down into the groove of cylinder I I. In this rod are fixed the straps 11, Table I, Fig. III, with one end, with the other to the groove of cylinder *i i*. After this you make the loops on the gear by passing a wire of the size of those in the chain around the iron bar or wire on the lower edge of the gear *v v*, beginning at one end and passing it around the back wires of the chain—that it, those which pass behind the wooden stick (or club) 7 7, Fig. I—in their turn, one after the other, each time drawing this wire of which the loops are made through the front wires of the chain and tying it to the aforesaid iron bar or wire. Then the round wooden club or bar 7 7 is put between the back and front part of the chain, or you may put it there before making the loops. After this put the hook *t* of the lever P, Table I, Fig. IX, on the teeth of the wheel R, so as to place the lever in a horizontal position; put the weight P *u* so far back from the wheel as to draw the cylinder *i i* around, and stretch the chain as much as necessary. Next to this regulate the cords or chains which connect treadle 4 with lever *p* and the handle *g* of the gear; then that which connects treadle 5 with the sley, so that the latter can descend but to a certain point; and, thirdly, the one which connects treadle 6 with the lever *p*. The cords connecting lever *p* with treadles 4 and 6 must be so shortened or lengthened as to pull the cylinder I I exactly as far around as the size or length of the meshes. The shuttles are the same as used for other looms.

It is to be observed yet that before tightening the chain the cylinder I I must be put down to its first position, the iron cylinder above it taken off, and the connection between the rack-wheel and the endless screw restored.

In order to weave, put the left foot steadily on the floor, and with the right one press down treadles 5 and 6, lifting at once the sley 10 and the lever *p*, which pushes cylinder I I around exactly the size of the meshes, as regulated. Put the wire on the shuttle through the chain, and take the right foot off again, whereby the sley will fall down to the point regulated by the length of the cord attached to it, and press the wire drawn with the shuttle through the chain in its proper place. Then press with the same (right) foot treadles 5 and 4, and thus lift again lever *p*, and at the same time the gear *v v*, drawing the back wires of the chain through and in front of the fore part of the chain, thus crossing the chain. You also lift, at the same time, the sley again; put the shuttle through the chain, take the foot off, and the sley drops again, as before, with the same effect. The gear also falls back into its former position, whereby the chain also is made to cross back into its first position. As often as the cylinder I I is pushed forward, cylinder *i i* is drawn forward by the weight of the lever P, and thus the chain kept tight until the weight P *u* reaches the floor, when you may, without loss of time, lift it up and fix it again in another place of the wheel R, and so on till the end of the web. When the iron bar on which the chain is fastened reaches, in the course of weaving, the cylinder *i i*, you take off the straps 11, Fig. III, Table I, and pin the bar down into the groove of the cylinder, and after the chain is off cylinder I I you take the rod or bar on which it is fastened out of the groove of the cylinder I I and attach the straps 11, Fig. III, to it, and fasten them on the cylinder I I, and thus you will finish the whole chain without losing more than a few inches of the chain. The cylinder *i i*, also, by being turned whenever the cylinder I I revolves the web, is wound upon it by the course of weaving, and there is no occasion to interrupt the latter operation for this purpose, and no time is lost.

In cases of very fine wire, it is necessary to unscrew the sley off the handles or arms and draw the wire (before fastening it to cylinder I I) through the reeds of said sley, after the wire has been arranged for the purpose of putting it on this loom. This will contribute to its being laid smoothly and evenly around the cylinder I I.

I claim—

1. The particular mode of making the size of the meshes equal by the combination formed by connecting, first, the contrivance for regulating the revolution of cylinder I I (as seen in sections 23 and 24 in the specification) by means of shortening or lengthening the cord N M D, which is attached to lever *p* and to the cord G F E D L at the point D; second, the similar contrivance for the same end by means of the cord V V V V, also attached to lever *p*, and by means of the iron strip S on lever 3, (on the cross-bar 1 2 3,) and, further, by means of spiral spring *x* and the cord on the back end of said lever 3, as described in section 25 of the specification; third, the contrivance for making, by means of the lever P, the revolution of cylinder *i i* correspond to that of cylinder I I, (whenever the chain is on the said cylinders and in the act of being woven,) thereby moving the web with every movement of said two cylinders a distance equal to the size of the meshes; fourth, the contrivance for regulating the descent of the sley 10, as described in section 16 of the specification, so as to reach down uniformly to the same distance, all which contrivances thus combined and regulated effect the object of making the meshes of an equal size.

2. The mode of constructing and working the gear as described, the upper edge of said gear pressing back the front division of the chain, and the lower edge, by its loops, drawing the back division of the chain through and in front of the former, thus crossing the chain by one pull with the foot on treadle 4, the act of recrossing being accomplished by merely letting go the said treadle, (after the just-mentioned pull,) whereby the two divisions drop into their former position and of course recross, by which contrivance the necessity of a second gear, required in other looms, is obviated, the operation of crossing the chain is made simpler, and accomplished with less labor.

MELCHIOR BRETZGER.

Witnesses:

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H. ABEL.