Sheet 1-8 Sheets.

J. Johnson.

Pile Fabric Loom.

No. 7,168. Patented Mar. 12, 1850.

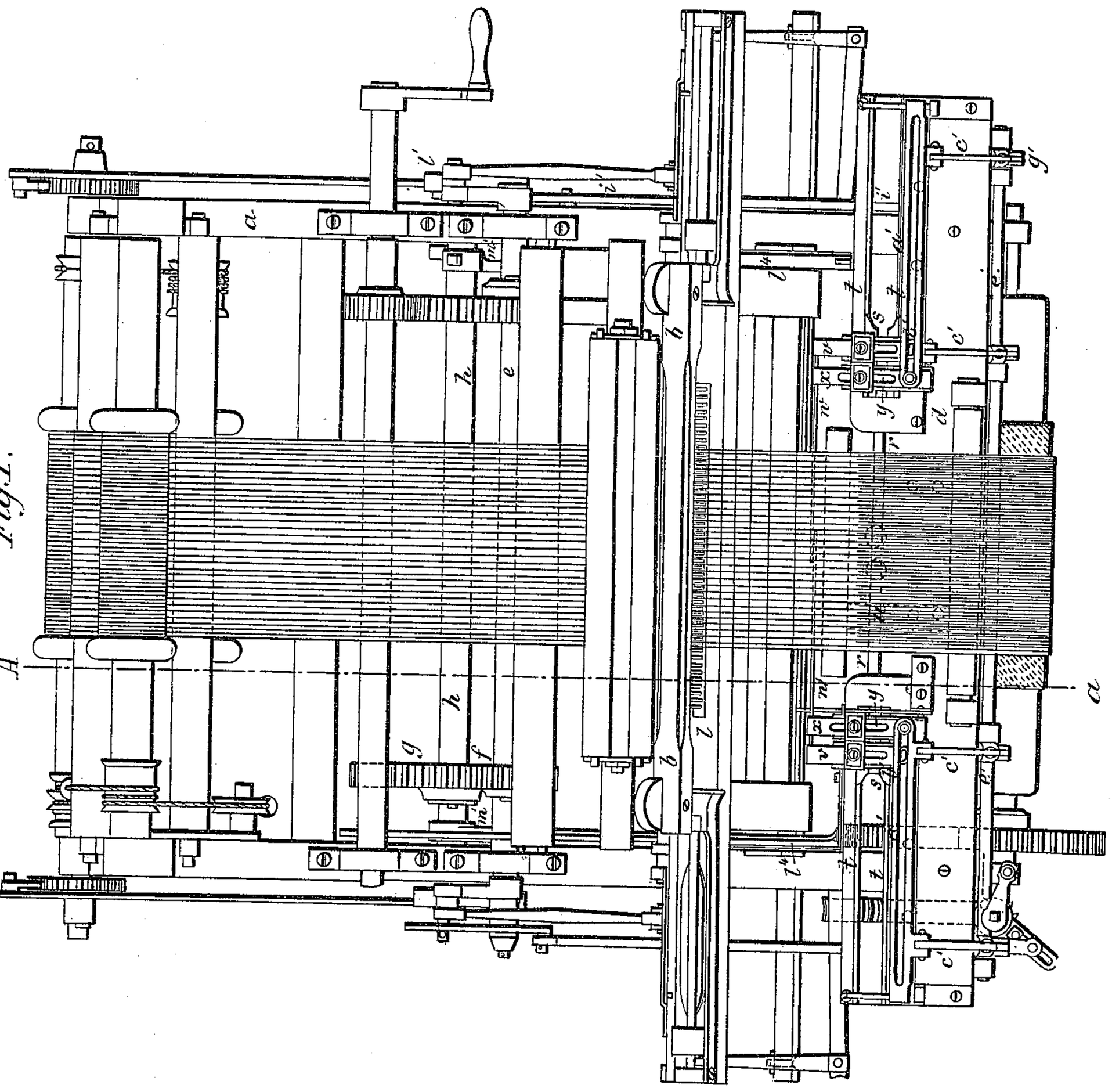

Fig. 1.

Sheet 2-8 Sheets.

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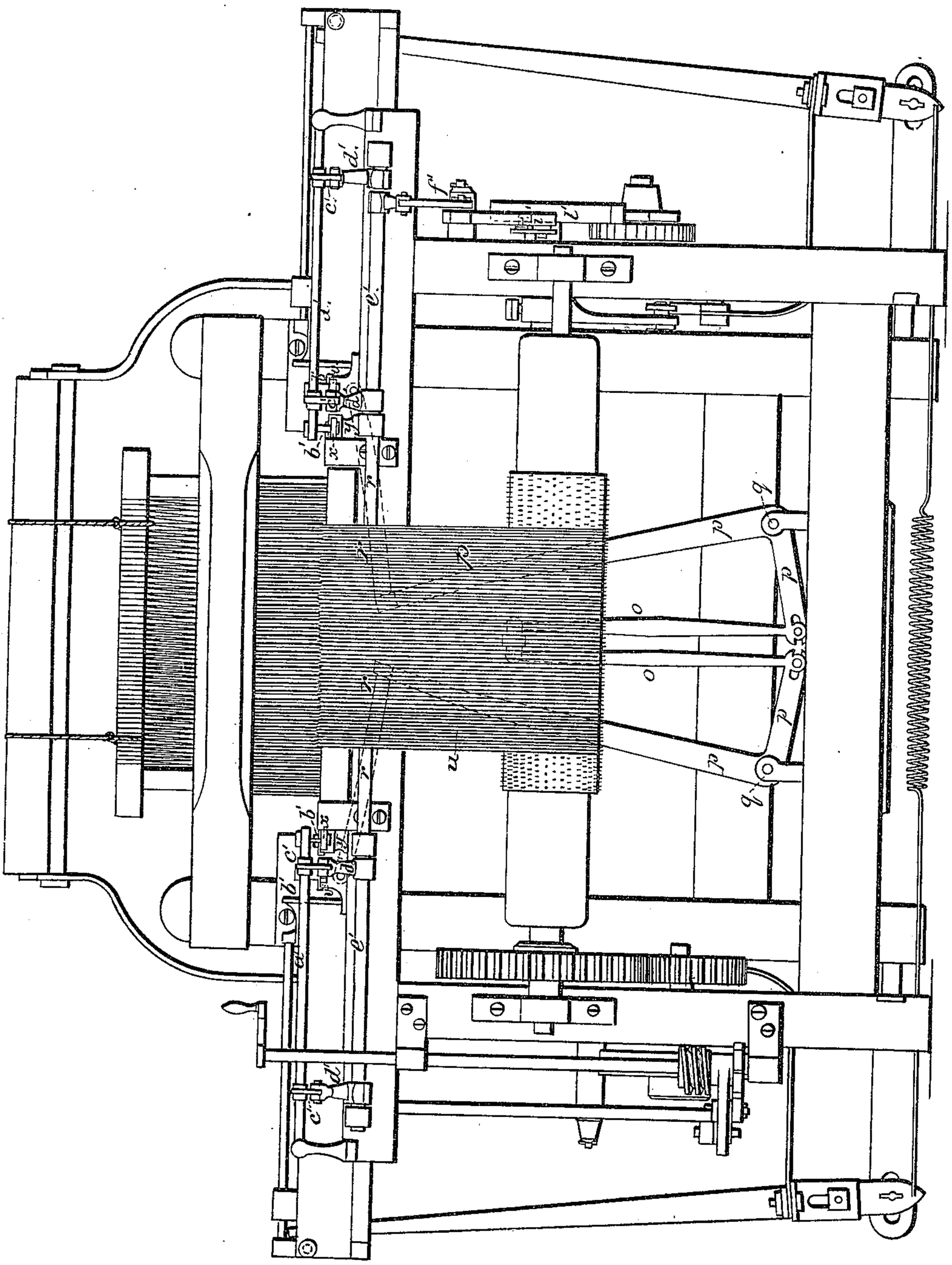

Fig. 2.

Sheet 3-8 Sheets.

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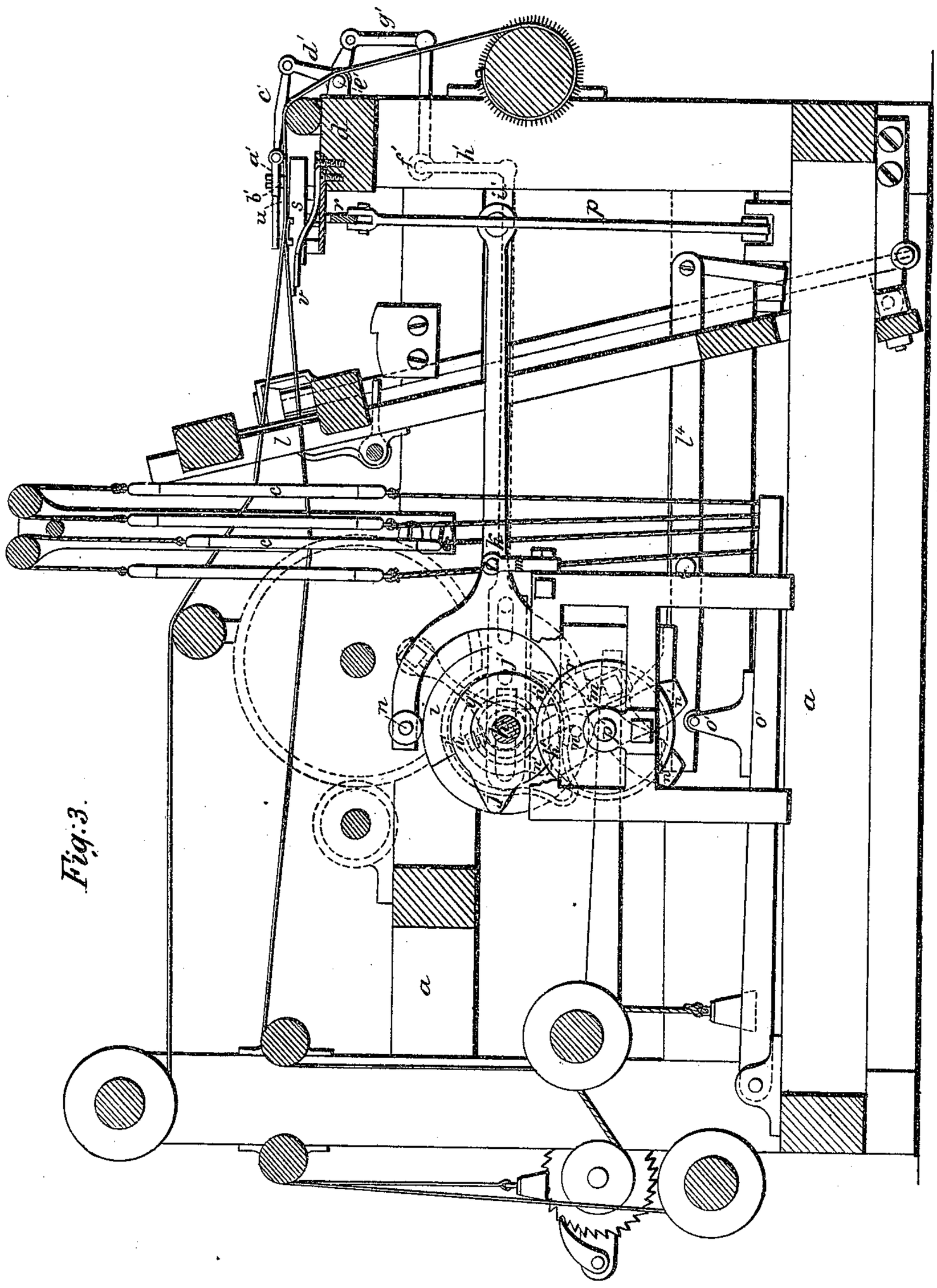

Fig: 3.

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Pile Fabric Loom.

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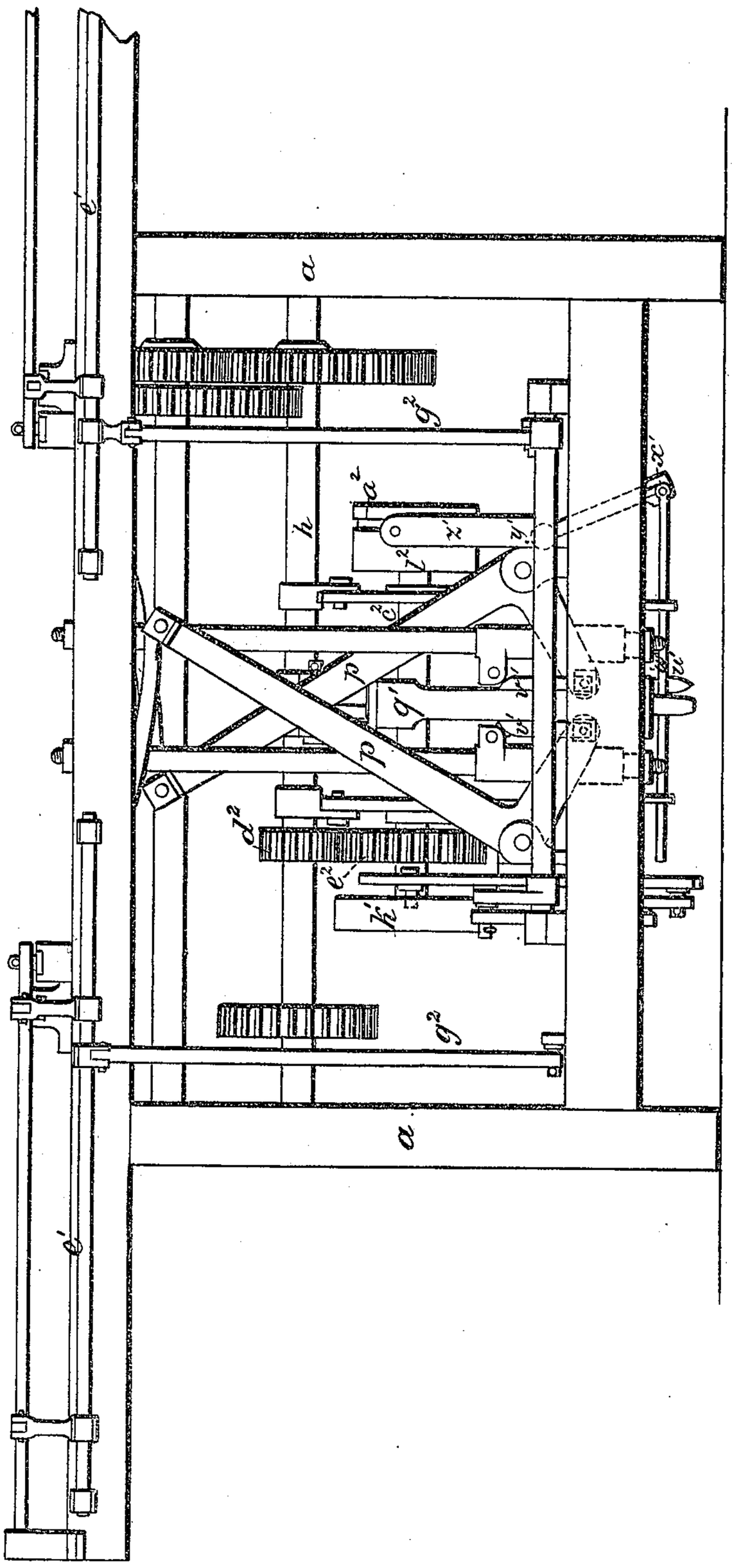

Fig: 4.

Sheet 5-8 Sheets.

J. Johnson.

Pile Fabric Loom.

No. 7,168. Patented Mar. 12, 1850.

Fig. 5.

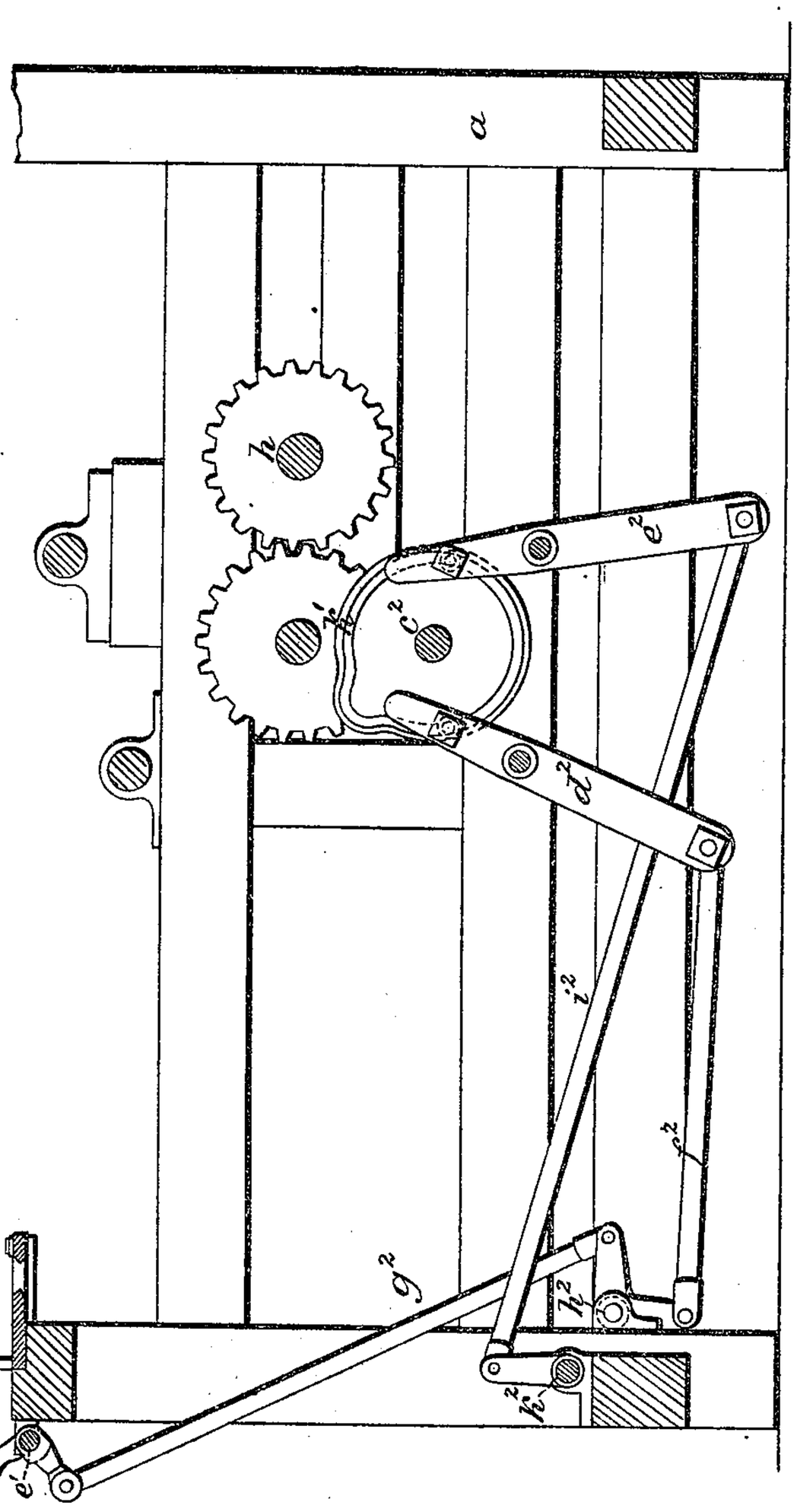

Fig. 9.

Fig. 8.

Sheet 6 - 8 Sheets.

J. Johnson.

Pile Fabric Loom.

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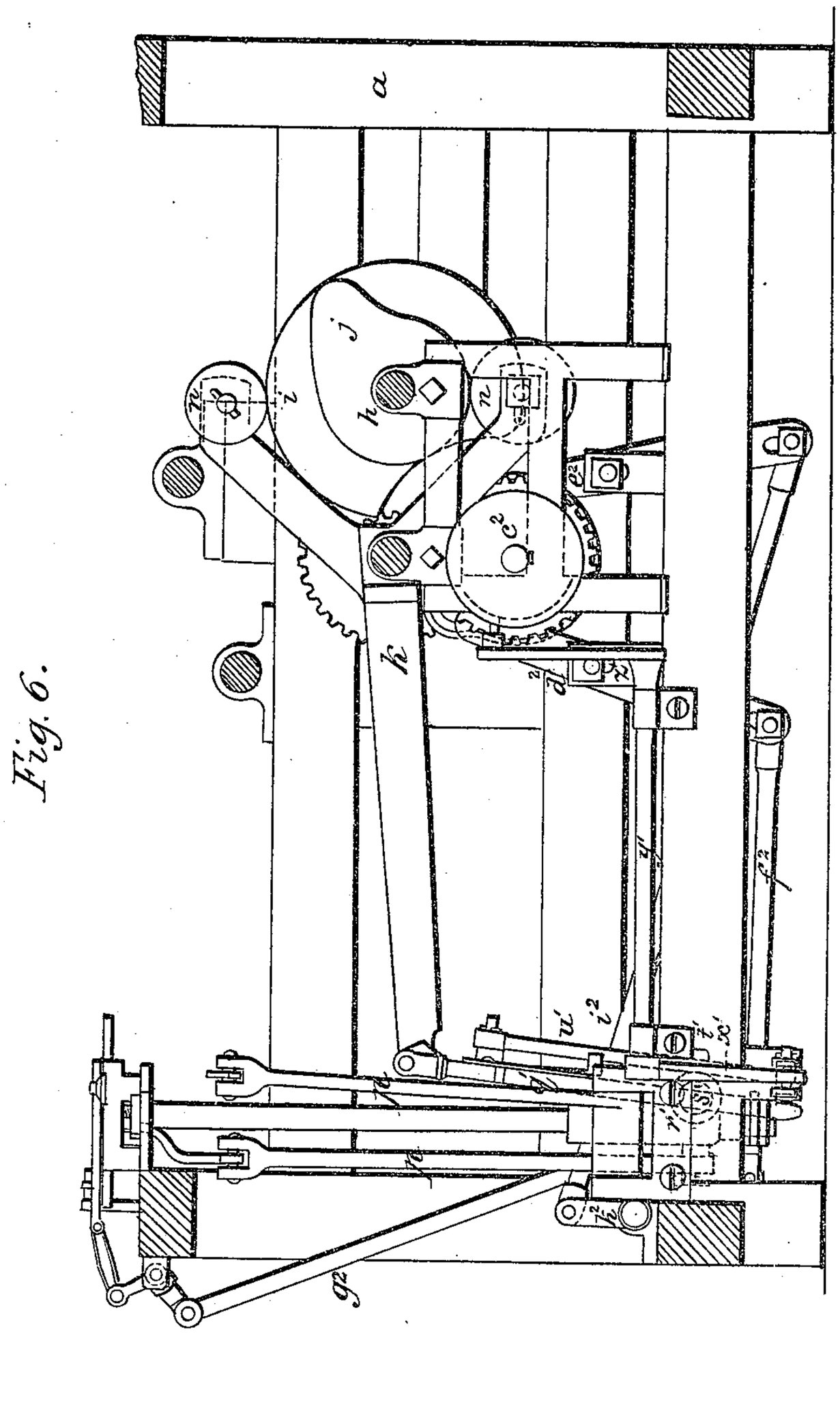

Fig. 6.

Sheet 7-8 Sheets.

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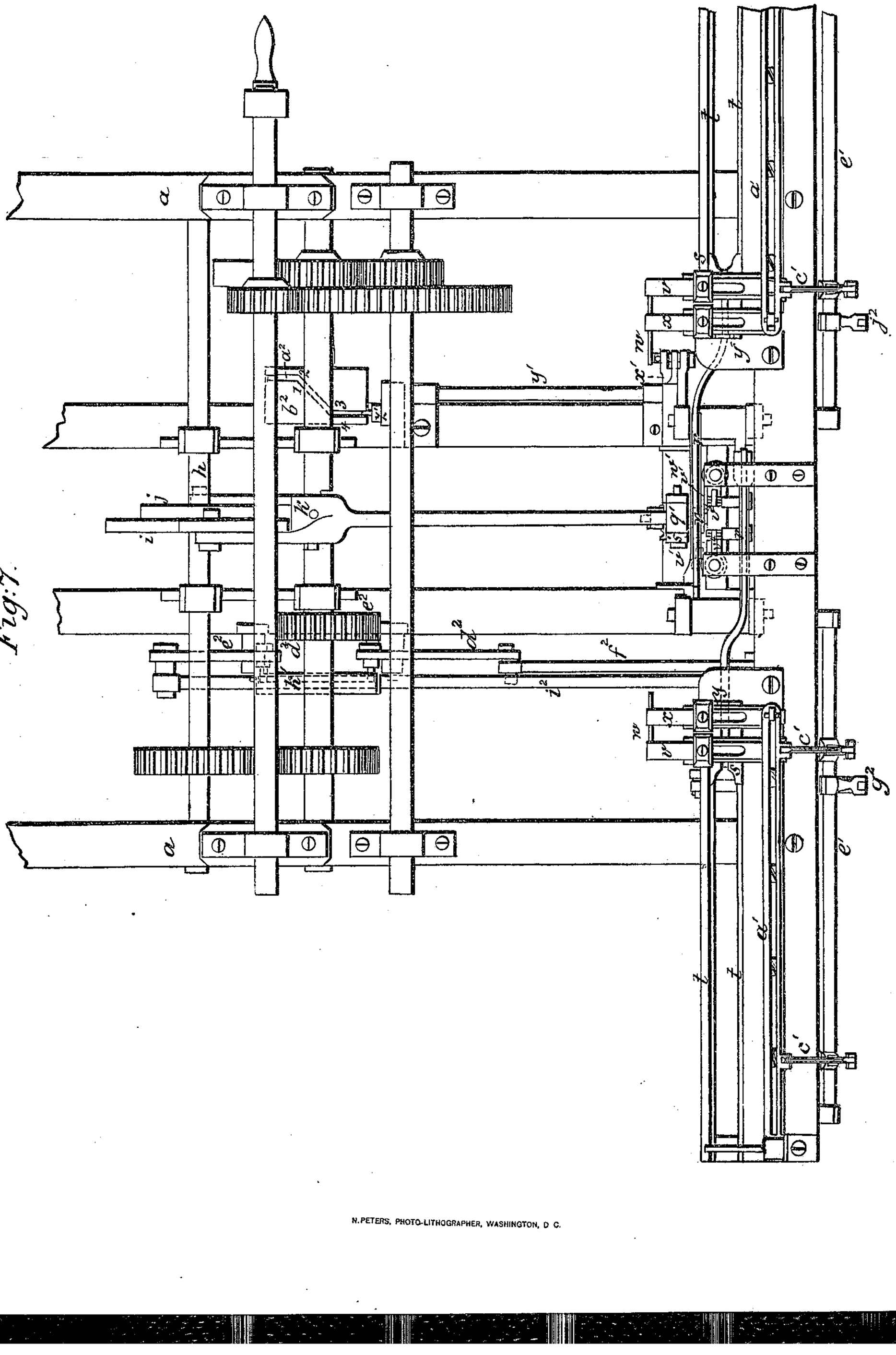


Fig: 7.

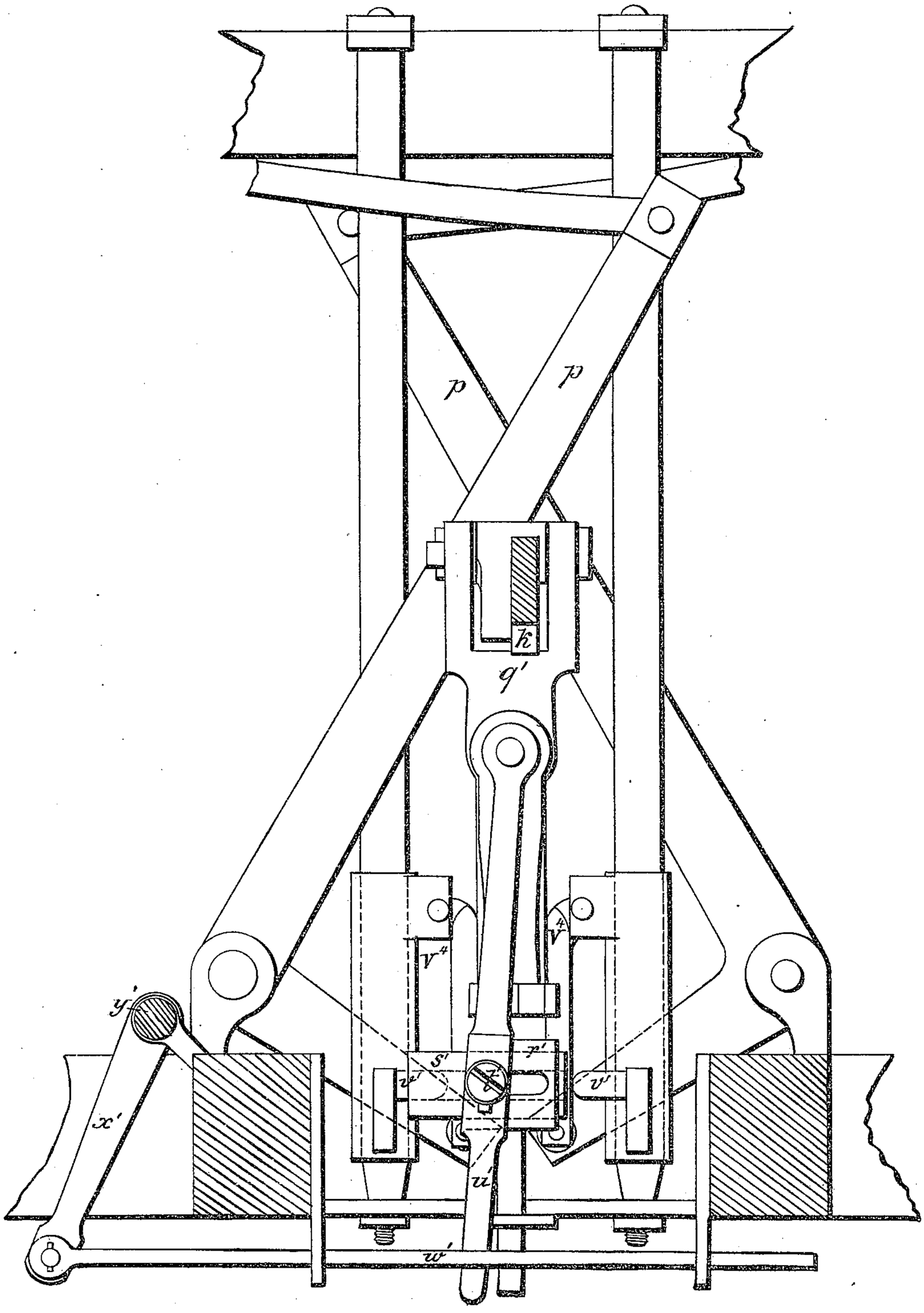
Sheet 8-8 Sheets.

J. Johnson.

Pile Fabric Loom.

No. 7,168. Patented Mar. 12, 1850.

Fig: 10.



UNITED STATES PATENT OFFICE.

JOHN JOHNSON, OF TROY, NEW YORK, ASSIGNOR TO ELIAS JOHNSON.

LOOM FOR WEAVING PILED FABRICS.

Specification of Letters Patent No. 7,168, dated March 12, 1850.

To all whom it may concern:

Be it known that I, JOHN JOHNSON, of Troy, Rensselaer county, in the State of New York, have invented certain new and useful Improvements in the Power-Loom for weaving Piled Fabrics such as velvets, tapestry, and velvet-tapestry carpets, &c.; and I do hereby declare that the following is a full, clear, and exact description of their nature and construction, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1, is a plan of my improved loom as applied to the weaving of tapestry carpets; Fig. 2 is a front elevation, and Fig. 3, a longitudinal vertical section of the same taken at the line (A, *a*,) of Fig. 1; Fig. 4 is a front elevation; Figs. 5 and 6 longitudinal vertical sections and Fig. 7 a plan of a modification of the same loom as applied to the weaving of velvet and velvet tapestry carpets, and Fig. 8 a separate view of the wires for forming and cutting the pile.

My improvements are applied to the weaving of all kinds of fabrics in which the surface is formed by looping the warps over wires which are then withdrawn, such as Brussels and tapestry carpets; and also to all kinds of fabrics in which the surface is formed by cutting such loops after they have been woven in, such as velvet, velvet tapestry carpets and all other fabrics known under the general appellation of velvets.

The first part of my invention which relates to the forming of the piled or looped surface, consists in inserting the figuring wire (or wires) into the open shed of the warps, and withdrawing it (or them) from under the pile or figuring loops by means of a carrier to which one end of the wire is attached, and which has a reciprocating motion from and toward the selvage to withdraw and insert the figuring or looping wire and also a motion toward and from the lathe of the loom to carry the figuring wire from the woven part of the open shed of the warps preparatory to the insertion thereof, and then a back motion to carry the wire up to and against the woven part of the fabric.

The second part of my invention consists in combining with the wire carrier a guide or support through which the figuring wire passes and in which it slides when the said guide or support is operated to move in unison with the wire carrier toward and from the lay.

The third part of my invention consists in forming the pile or loops on two wires introduced from opposite sides of the fabric and which lap in the middle of the fabric, the ends being champered at the lap, whereby the inconvenience arising from the use of long wires in weaving wide fabrics is avoided.

And the fourth part of my invention consists in so arranging the shuttle and harness motions as to omit one pick in the formation of every range of loops that the lay may make one beat without throwing the shuttle or working the warps to beat up the wire before the insertion of the filling or weft.

In Figures 1, 2 and 3 of the accompanying drawings (*a*) represents the frame, (*b*) the lay, (*c*) the harness and (*d*) the breast beam, all constructed in the usual manner. The lay is operated in the usual manner by cranks on the lay shaft (*e*) which has a pinion (*f*) on one end that engages the cogs of a wheel (*g*) on a shaft (*h*) below which carries all the cams for operating the figuring wires and for giving the shuttle motions, and the motions of these two shafts are three of the lay shaft to one of the other.

The weaving of the cloth and the forming of the loops do not differ from the usual mode of making this kind of fabrics, and therefore the following description will be limited entirely to the description of the new parts which constitute my improvements and to their connection with the well known parts.

On the shaft (*h*) which is denominated the wire cam shaft, there is a compound cam (*i*, *j*) embraced by the forked end of a lever (*k*) which has its fulcrum at (*l*) in an appropriate standard (*m*). The two prongs of the forked end of the lever have each a roller (*n*) each of which bears on its appropriate part of the cam; the roller on the upper arm bears on the periphery of the part (*i*) of the cam and the other on the periphery of the other part (*j*) of the cam. About two thirds of the periphery of this two part cam is concentric to keep the lever

in a fixed position during the time of working the harness, throwing the shuttles and beating up the cloth, and the other third is so formed as to depress and elevate the lever to give the required motions to the figuring wires. And the cam is made in two parts, acting on the two arms of the forked end of the lever, to give the down and up motions of the lever that these may be positive and accurate, although a single cam may be substituted with a weight or spring of sufficient force to carry back the lever; but the two part cam is deemed the best. The forward end of this lever (k) is connected by means of two joint links (o, o) with the short arm of two levers (p, p) one on each side, that turn on fulcrum pins (q, q,); and the upper arm of these levers are each in turn connected by joint links (r, r,) with a slide (s) one on each side. These slides work horizontally between ways (t, t) attached to the breast beam, so that at each rotation of the compound cam the two slides are moved out and in from and toward the selvage of the cloth (u). The upper surface of the slides (s, s) are grooved at right angles to their line of motion and to these grooves are fitted two carriers (v, v) which slide freely but accurately in the grooves, and these carriers are of such length as to project beyond the slides (s, s,) and to the inner end of each is secured a figuring wire (w) of such length that when the two slides are drawn in toward the selvage of the cloth the ends of the two wires shall pass by each other and overlap, their ends being champered or beveled off where they lap so that when brought together they shall be of the same thickness throughout the whole breadth of the cloth, and thus present an uniform and equal diameter from end to end. Each wire passes and slides freely, but accurately through a hole in a guide or support (x) (one on each side of the cloth) which is fitted to and slides in a block (y) in manner similar to the carriers. The carriers and guides are arranged in pairs, one guide and one carrier on each side of the loom. And as each pair, after the carrier has withdrawn the figuring wire from under the woven pile, is to carry the wire back toward the lay that it may be introduced in the open shed, and then move back to carry the wire up against the woven part of the cloth, it follows that each pair must have the same back and forth motions and that whilst these motions are given that the carrier must be free to receive the lateral motions for withdrawing and inserting the wire. These things are effected by two bars (a' a') one on each side, which have each a long slot which receive pins (b' b') from the upper surface of the guides and carriers, the slot being such that the pin of the carriers can slide therein freely, and yet receive from the bars the required back and forth motions. Each bar is jointed by means of two joint links (c' c') with two arms (d' d') of a rock-shaft (e') which extends entirely across in front of the breast beam—the said rock shaft being in turn connected with another rock shaft (f') by means of a joint link (g')—on the said rock shaft (f') there is an arm (h') jointed to a sliding bar (i') which at its other end carries a roller (j') which is acted upon by a cam groove (k') in the face of a wheel (l') in the wire cam shaft (k).

The cam groove is concentric for about $\frac{8}{9}$ of the circumference to keep all this part of the machinery in a fixed position, and for the remaining part of the circumference it runs out and back to the concentric part to give the required rocking motion. The form of this cam groove and the sliding bar and roller are represented by red lines in Fig. 3, of the drawings. And the position of this cam groove relatively to the compound cam and the position of the latter relatively to the other parts of the loom should be such that after the weft threads have been beat up and as the lay is receding and the harness is opening the shed of the warps the compound cam begins to depress the forked end of the lever (k) to force out the carriers to withdraw the two figuring wires from under the pile or figuring loops and so soon as these are drawn out clear of the selvage then the cam groove begins to operate the rock shaft to carry the two guides and carriers with the wires toward the lay, that is toward the open shed of the warps, and when these have been carried back then the compound cam begins to elevate the forked end of the lever (k) to force the carriers toward the selvage and introduce the figuring wires in the open shed, the cam groove toward the end of this operation gives the back rocking motion to the rock shaft to carry the guides and carriers back to draw the wires up against the woven part of the cloth. The lay then beats up to force the figuring wires fairly up against the woolen cloth, and as it recedes the warps are shifted by the harness and two picks are made to weave in and tie the range of loops forward over the wires, and then the wires are again withdrawn and all the operations repeated.

The picker treadles (l^4 l^4) are operated by picker tappets (m', m') on the wire cam shaft, the said picker tappets being placed at an angle of 120 degrees with each other so that during three beats of the lay there shall be but two throws of the shuttle. But to make this more clear, the first beat of the lay, after the figuring wires have been introduced, is simply to beat up the wires, and there being no throw of the shuttle for this beat, but for each of the other two beats

there is a throw of the shuttle. There is the same intermission in the working of the harness as in the throw of the shuttle and for the same purpose. The harness treadles (o', o', o',) are operated by tappets (n' n' n',) on a shaft (p') below the wire cam shaft, and receiving motion from it by a pinion and cog wheel (q'') and (r'') so proportioned that the former shall make two revolutions to one of the latter, so that the shaft which carries the tappets for working the harness treadles makes one revolution to six beats of the lay.

The treadles and the tappets are divided into two sets, one set for the foundation warps and the other for the figuring warps and as these must alternate, as is well known to those who are acquainted with the weaving of this kind of fabric, the two sets of tappets are together represented as dividing the circle into six parts, that is one half of the circle for each set, and three divisions for each half circle, so that the tappets are arranged on each of these divisions, but as there must be an intermission for that beat of the lay which beats up the figuring wires no tappet is put into one of the divisions in each of the two sets so that there are but two tappets for each set, the omission being made to correspond with that beat of the lay which beats up the wires.

I contemplate and have so essayed working the two figuring wires alternately, in which case each wire must be of sufficient length to extend entirely across the width of the cloth, and when so modified one wire remains in the figuring loops while the other is being operated to form the succeeding range of loops.

In Figs. 4, 5 and 6, of the accompanying drawings the compound cam shaft (h) for operating the forked lever (k) as also that lever are the same as in the preceding; but instead of connecting this lever (k) by joint links with the two levers (p p) that move the slides of the carriers, it is jointed to a vertical bar (q') which is alternately connected with the levers (p) to operate them alternately. Toward the lower end the bar (q') has an enlarged hollow boss (r') to which is fitted a sliding coupling tube (s') (which may be termed a shifting coupling) provided with a pin (t') that passes out through a slot in the boss, and this pin is jointed to a lever (u') jointed at its upper end to the bar near its upper end, so that when this lever is removed either to the right or left the coupling tube is made to protrude either to the one or the other side of the bar. The short arm of each of the two levers (p p) is jointed by a link (v^4) with a slide that works on a vertical rod and from each of these slides projects a cylindrical pin (v' v') and the position of these two pins are such that when the tube coupling (s') is shifted to one side it fits onto the pin of one of the slides, and when on the other side onto the pin of the other slide, hence it follows that for the purpose of operating the two figuring wires alternately the coupling tube must be alternately shifted from one side to the other which is effected in the following manner. As the bar (q') descends the lower end of the lever (u') that operates the coupling tube enters a hole in a sliding bar (w') jointed to an arm (x') of a rock shaft (y') provided at the other end with another arm (z') having a pin embraced by a cam groove (a^2) on a cylinder (b^2) on one end of a shaft (c^2) receiving motion from the wire cam shaft (h) by a pinion and cog wheel (d^2) and (e^2) so proportioned that it makes one revolution to two of the wire cam shaft. The form of the cam groove is shown in Fig. 7,—which represents one half of the circumference in full lines and the other half in dotted lines—from which it will be seen that for a portion of the circumference from the point 1 to 2 it runs in the direction of the periphery to keep the rock shaft fixed, then it runs from 2 to 3 in a diagonal direction to rock the shaft to shift the coupling tube from one lever to the other, then from 3 to 4 it again runs in the direction of the periphery to keep the rock shaft in the new position during the time that one of the figuring wires is operated, and then from the point 4 to the place of beginning it runs in the reverse diagonal direction to shift the coupling tube to the other lever to operate the other figuring wire. In this way the motions are alternated—one wire remaining under one range of loops while the other is being operated for the formation of a new range of loops. But as the carriers on each side are operated alternately the same rock shaft (y') cannot be used for operating both sets of guides and carriers, and to this end there are two such rock shafts one at each end, and both operated by the same cam groove (k') as in the first example but placed on the same shaft as the cam (a^2) just above described. But this cam groove operates two levers (d^2) and (e^2) one on each side; the one (d^2) communicating motion to one of the rock shafts (e') by joint links (f^2) and (g^2) and an intermediate rock shaft (h^2) and the other to the other rock shaft (e') by two other joint links (i^2) and (g^2) and an intermediate rock shaft. And as the two levers (d^2) and (e^2) which receive motion from the cam groove to operate the carriers and guides are on opposite sides of the axis of the cam groove it follows that their motions must alternate. The cam groove (k') is the same in form and purpose as in the example given in Figs. 1, 2 and 3. The end of each figuring wire is

flattened and formed with a sharp cutting edge on the upper surface as shown in Fig. 8 so that when the wire is withdrawn this cutting edge severs the range of loops to form the cut pile. This device will be made the subject of another application for Letters Patent now in process of preparation.

It will be obvious from the foregoing that some parts of my invention may be employed without the others, as for instance, the cutting edges of the figuring wires are only to be used in the weaving of such fabrics as have the pile or surfaces formed with the cut loops.

The third part of my invention may be dispensed with by making the figuring wires of sufficient length to extend each entirely across the fabric, in which case only one wire may be used; but when the two are used the then motions must alternate; as above described. And the fourth part of my invention may also be dispensed with, but in that case the operation will not be so perfect, as the beating up of the figuring wire before the throw of the shuttle and the working of the harness is essential to the proper formation of the fabric.

I do not wish to limit myself to the precise arrangement of parts herein specified for giving the required motions as these may be variously modified to effect the same end and by mechanical equivalents.

What I claim therefore as my invention and desire to secure by Letters Patent is—

1. The method of inserting the figuring wire (or wires) into the open shed and withdrawing the same from under the woven pile or loops by means of a carrier (or carriers) to which one end of the figuring wire (or wires) is (or are) attached, when the said carrier (or carriers) is so operated, substantially as herein described, as to receive a motion from and toward the selvage of the fabric to withdraw and insert the wire, and toward and from the lay to carry the wire to the open shed and when inserted back against the woven part of the fabric, all substantially as herein described.

2. I also claim combining with each carrier and figuring wire a guide or support through which the wire passes, substantially as described, when the said guide receives a motion toward and from the lay in unison with the carrier substantially as described.

3. I also claim forming each range of figuring loops on two wires introduced from opposite sides and overlapping in the middle with the lapping ends champered or beveled, substantially as described.

JOHN JOHNSON.

Witnesses:
JOHN S. HOLDEN,
CHAS. R. CHURCH.