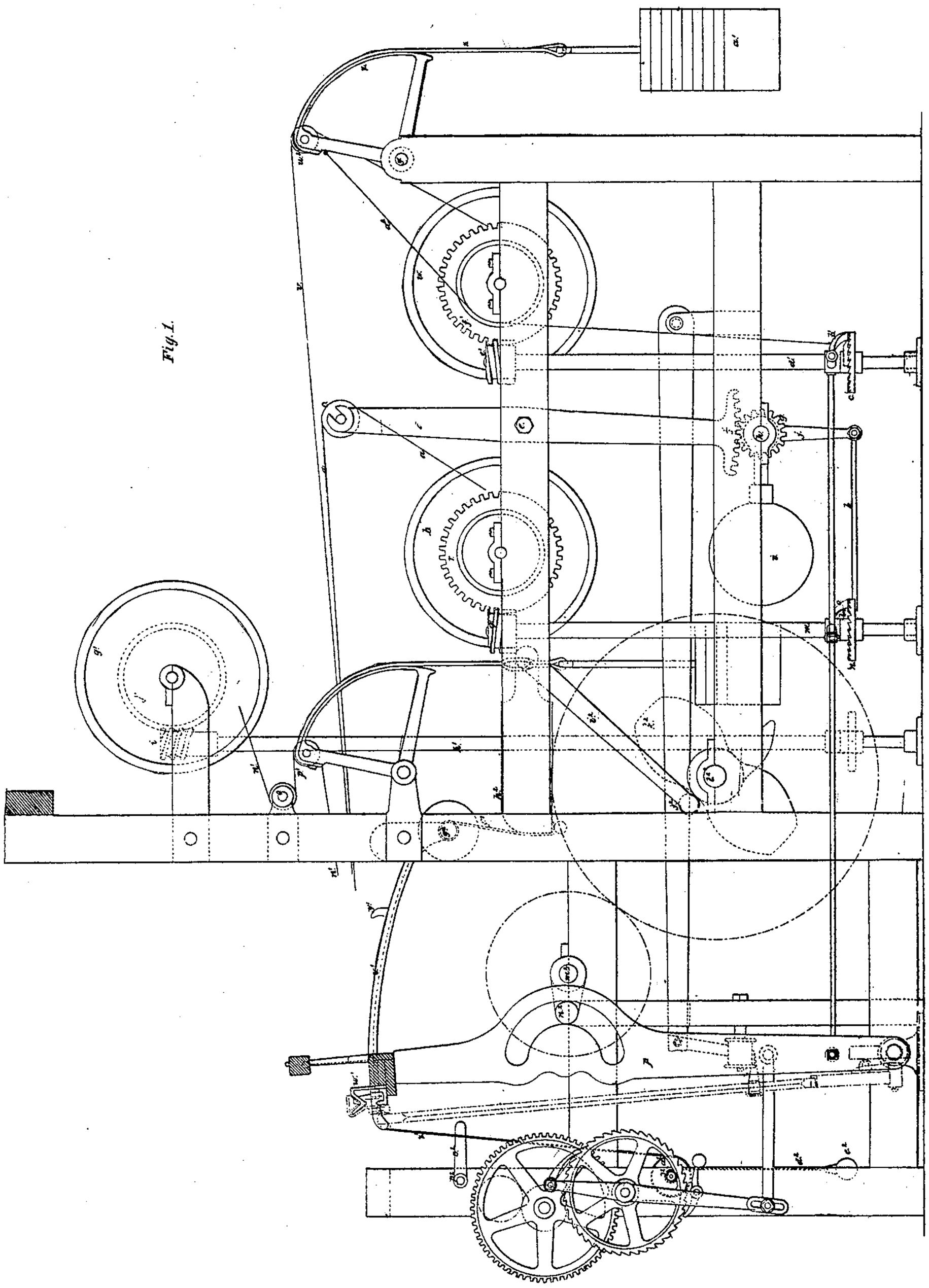
E. B. Bigelow. Sheet 1, 4 Sheets.

Carpet Weaving Loom.

No. 7,884. Patented Jan. 7, 1851.

Fig. 1.



E. B. Bigelow. Sheets, 4 Sheets.

Carpet Weaving Loom.

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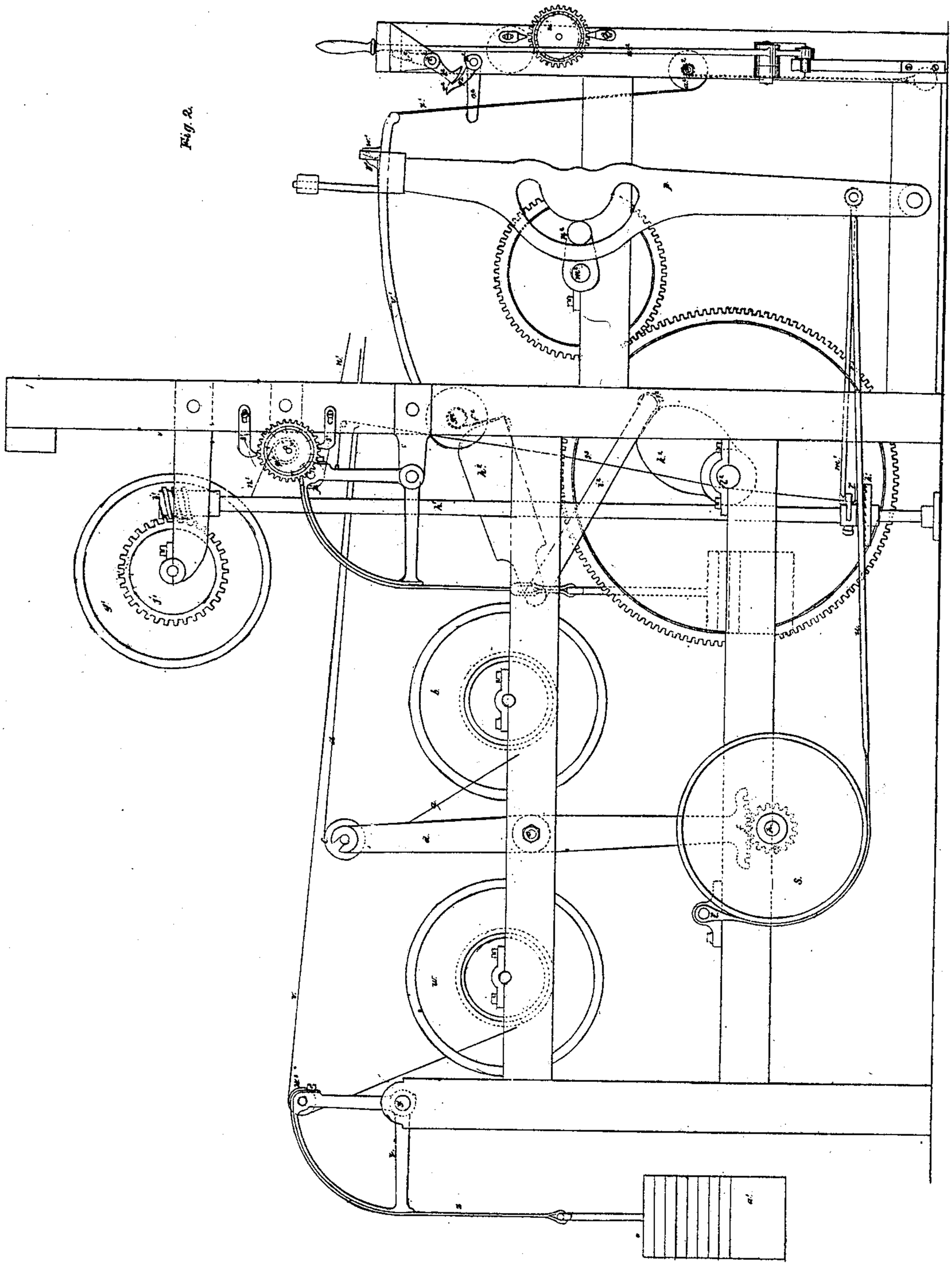
Fig. 2.



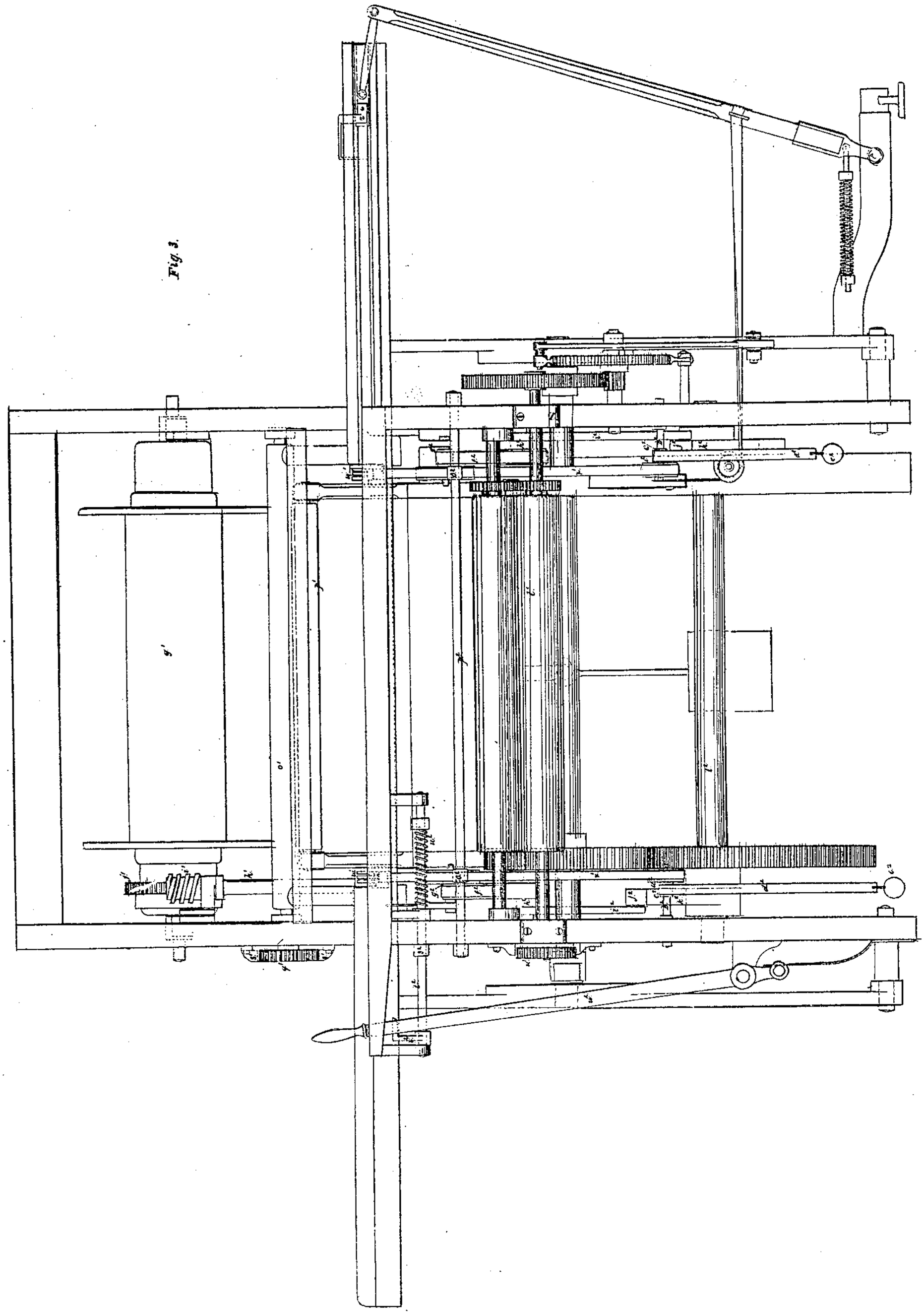
Sheet 3, 4 Sheets.

E. B. Bigelow.

Carpet Weaving Loom.

No. 7,884 Patented Jan. 7, 1851.

Fig. 3.



Sheet 4, 4 Sheets

E. B. Bigelow.

Carpet Weaving Loom.

No. 7,884. Patented Jan. 7, 1851.

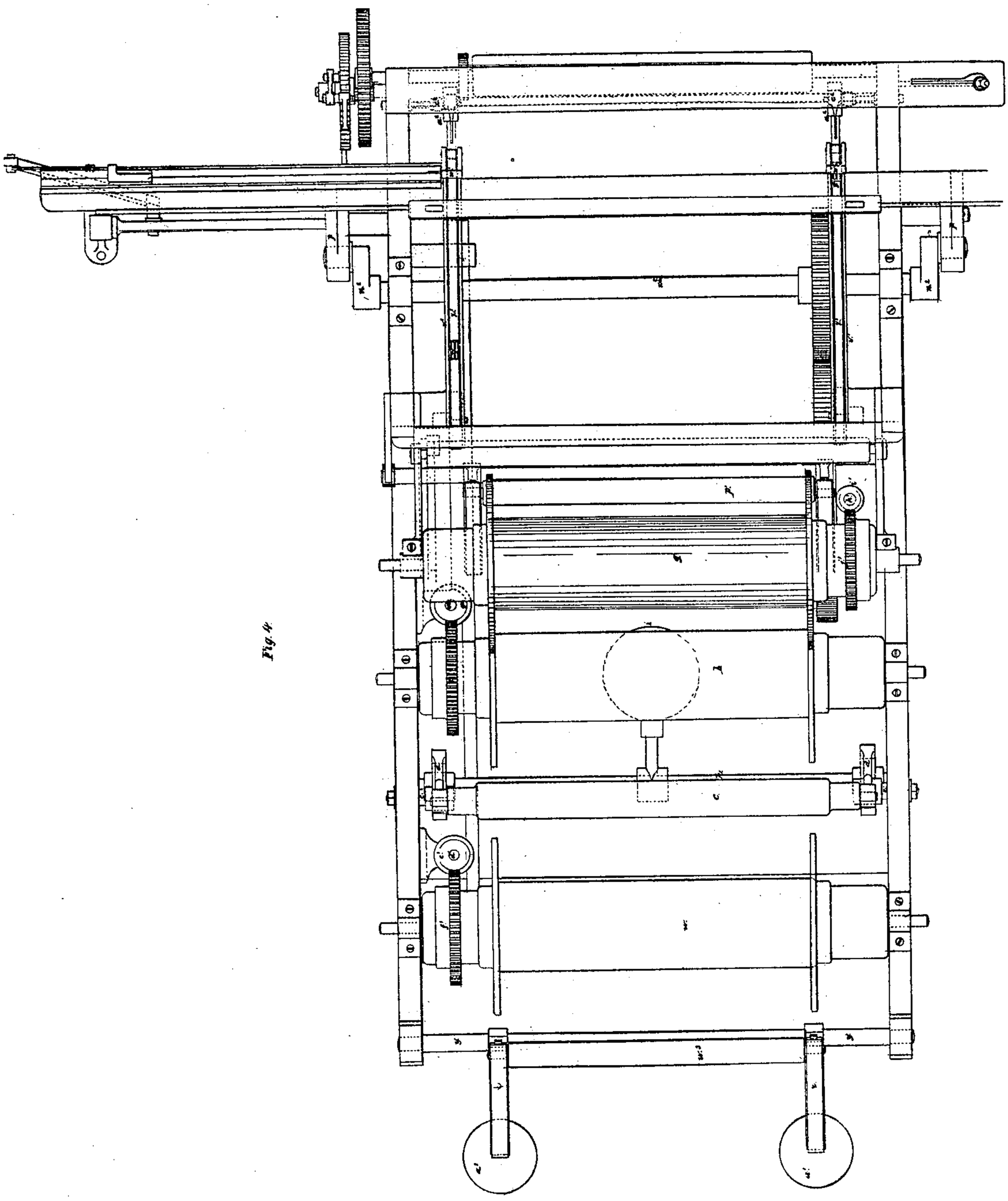


Fig. 4.

UNITED STATES PATENT OFFICE.

E. B. BIGELOW, OF CLINTONVILLE, MASSACHUSETTS.

LOOM FOR WEAVING TAPESTRY CARPETS WITH PARTY-COLORED WARP.

Specification of Letters Patent No. 7,884, dated January 7, 1851.

To all whom it may concern:

Be it known that I, ERASTUS B. BIGELOW, of Clintonville, in the county of Worcester and State of Massachusetts, have invented certain improvements in the Loom for Weaving Tapestry Carpeting, and that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known and of the method of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is an elevation of the right hand side of the loom, Fig. 2 a like elevation of the left hand side, Fig. 3 a front elevation and Fig. 4 a plan.

The same letters indicate like parts in all the figures.

Tapestry carpets are generally composed of three separate warps, viz: the ground warp, the slack ground warp, and the figuring warp. The ground warp controls the length of the cloth woven at each beat of the lathe, the slack ground warp forms the back of the cloth, and the figuring warp forms the figuring loops or face of the cloth. The figuring warp is previously printed with the figure so elongated that when gathered up to form the figuring loops the required form of figure will be produced on the cloth.

In the weaving of figured carpets it is highly important that all the figures along the entire length of the piece be precisely of the same measured length, that when the carpet is put together the figures may be accurately matched. When the figure is produced by the jacquard, it is only necessary to measure out the cloth, but in tapestry carpets it is also necessary to measure out the figuring warps to prevent the figure produced from being imperfect, and at the same time, it is important to have the fabric as uniform in texture as practicable. To these ends my present improvements have been directed.

The first part of my invention consists in regulating the delivery or giving out of one or more separate warps or chains by the separate tension of each warp in combination with a ground or controlling warp, which determines the length of cloth made at each beat of the lathe, the delivery of said ground or controlling warp being also regulated by its tension and controlled or fixed by a break when the lathe beats up the cloth; the whole being combined with a regular and positive take up motion for taking up the finished cloth, whereby the figures of the cloth may be of a regular measured length, and the body of the cloth, as nearly as practicable of a regular texture as described.

The second part of my invention consists in the employment of an index measuring apparatus or the equivalent thereof to indicate the amount of figuring warps which are taken up in the process of weaving, that the tension thereof may be varied if more or less than sufficient is being woven in, when this is combined with an index measuring apparatus or the equivalent thereof to indicate the amount of cloth woven, whereby the figure on the warps and on the woven cloth can be relatively measured to determine the entire figure while the delivery of the figuring warps is self adapting to any slight inequality in the warps or the formation of the loops. And the last part of my invention consists in the employment of grids or fingers vibrating independent of the lathe for drawing forward and giving tension to the weft before the lathe completes its beating up movement, and also to retain the weft while the lathe commences its back movement to prevent such back-movement of the lathe from drawing back the filling or weft. There are many parts represented in the drawings which make no part of my present invention and which therefore need not to be described.

In the accompanying drawings (*a*) represents the ground warp, which passes from the warp beam (*b*) over the tension roller (*c*) and thence through the harness and reed in the usual manner. The tension roller (*c*) has its bearings in the upper arms of two levers (*d*, *d*,) that turn on stud pins (*e*, *e*,) their lower arms being in the form of cogged sectors (*f*, *f*,) the cogs of which engage pinions (*g*, *g*,) on a shaft (*h*) and from this shaft projects an arm with a weight (*i*) which tends constantly to turn the said shaft, and, by the connection of the pinions and cogged sectors tends constantly to force the roller (*c*) back from the lathe and thereby to exert a tensive force on the warps. The said shaft has also another arm

(j) jointed to a connecting rod (k) which, at its other end, is jointed to a wedge-piece (l) that turns on a vertical shaft (m) and just over a crown ratchet wheel (n) attached thereto. This said wedge-piece (l) is so formed and situated that when the warps are under a tension so great as to overcome the gravity of the weight (i) the tension roller around which they pass will be drawn forward and by this movement push the said wedge-piece (l) from under a ratchet pawl or hand (o) which is jointed to and receives motion from the lathe (p). This permits the pawl or hand to act on the ratchet teeth to turn the shaft (m) which by a worm (q) on the upper end thereof, that engages the cogs of a wheel (r) on the warp beam, gives out the required supply of warps. But when the supply of warps is sufficient, the weight carries back the tension roller which draws the wedge-piece under the pawl or hand to disengage it from the cogs of the ratchet wheel, which stops the further supply of warps until the tension again requires a supply.

When the lathe beats up the weight an additional strain is given to the warps which would affect the position of the tension roller and its connection with the let-off motion of the warp beam, even when no further supply is required. To prevent this, on one end of the shaft (h) there is a brake wheel (s) around the periphery of which passes a brake strap (t) the rod (u) of which is jointed to the lathe, so that as the lathe beats up, it draws the brake strap onto the brake wheel and there holds it during the beat on the cloth to prevent the tension roller from yielding to the tension due to the beating up of the cloth; but the moment the lathe begins to recede then the brake is liberated and the tension roller is at liberty to perform its appropriate function in regulating the delivery of the warps.

The slack ground warp (v) passes from a beam (w) over a tension roller (w^3) and thence through the harness and reed in the usual manner. The tension roller has its bearings in sector levers (x) which are fixed to the shaft (y) and to each of the levers is attached a strap (h) which passes over the sector and carrying a rod at the lower end adapted to receive a series of weights (a') which give the required tension to the warps. The number of weights may be increased or diminished that any degree of tension may be given to the warps according to the intended texture of the cloth desired to be produced. The beam (w) of the slack warp is operated for giving out the warps by a pawl or ratchet haid (b'), ratchet wheel (c'), shaft (d'), worm (e') and cog-wheel (f') in the same manner as the let-off motion of the ground warp, and the pawl or ratchet hand (b') is operated by a connecting rod jointed to it and to the lever of the pawl which operates the let-off motion of the ground warp. A cord (a^3) is attached to one of the levers of the tension roller (w^3) and passes down to and is attached to the pawl or ratchet hand, so that when the warps become too slack, the tension roller is carried back by the weight, which, by means of the cord lifts the pawl from the ratchet wheel, and thus the let-off motion is suspended until the tension roller is again drawn forward by the too great tension of the warps, when the let-off motion is renewed. As the ground warp resists the beat of the lathe, it is not necessary to connect a brake with the tension roller of the other warps.

The figuring warp beam (g') receives motion from a vertical shaft (h') by means of a worm (i') and cog-wheel (j'). The said shaft having a crown ratchet wheel (k') operated by a pawl or ratchet hand (l') jointed to the lathe by a connecting rod (m') in manner similar to the left-off motion of the ground warp. The let-off motion of this warp is arrested and renewed by the cord (s^6) actuated by the tension of the warp in the same manner as in the case of the slack ground warp above described. The figuring warps (n') pass from the beam (g') over a measuring roller (o'), then around a tension roller (p'), and thence through the reed in the usual manner. The tension roller is mounted and weighted in manner similar to the tension roller of the slack ground warps and for the same purpose. But as, in the forming and weaving in of the figuring loops or pile more or less warp may be taken than necessary, which would injure the figure, the measuring roller (o') is connected at one end with an index wheel (q'). This index wheel turns freely on an eccentric (r') on the end of the measuring roller, so that, at every revolution, the index wheel is carried up and down to the extent of the eccentricity. The periphery of the wheel is cogged, and there are two spurs (s' s') attached to the frame, one above and the other below the periphery of the wheel, and so located that, as the wheel is elevated, one of the spaces between the cogs catches into the upper spur, which then becomes the fulcrum on which the wheel is vibrated by the eccentric as it continues to turn, so that the wheel in descending toward the lower spur shall be caught thereby in the space next to the one which caught the preceding revolution. In this way, at each revolution of the measuring roller, the index wheel is turned to the distance of one cog.

The take-up roller (t'), around which the woven cloth passes to be taken up by a positive and regular motion, is provided in like manner with a like measuring or index

wheel (u') and the indices on the two wheels are so divided and numbered as to indicate when the figuring warps are being woven in so as to adapt the figure printed thereon to the production of a perfect figure of a given length on the woven cloth; but if the index indicates that more or less than enough is being woven in, then the weights on the sector levers are to be reduced or increased to reduce or increase the tension of the warps which will vary the amount woven in for a given length of cloth. The proportion of the indices will, of course, depend on the quality of cloth to be woven and on the printing of the warps. On each side of the lathe there is a sector bar (v') attached to the frame and having the same radius as the corresponding part of the lathe, and near the forward end they have vertically projecting fingers (w') which may be called grids. The upper surface of these bars, back and under the fingers (w') are grooved to form ways in which slide straps (x' x') that carry corresponding fingers (y' y') that, when drawn forward, enter the spaces between the stationary fingers. The back set of movable fingers (y') is drawn forward by a strap (x' x') which winds around and is attached to the periphery of a roller (a^2) on an arbor (b^2) which carries a smaller pulley (c^2) to which is attached another strap (d^2) which winds around it and to which is suspended a small weight (e^2) of sufficient gravity to draw the fingers forward with greater velocity than the lathe beats up. And each set of the said fingers is drawn back by another strap (f^2) which passes over a roller (g^2) at the back of the bar, which strap is attached to a weight (h^2) of sufficient size to overcome the weight which draws them forward. The said weight (h^2) forms one arm of a bent lever, the other arm (i^2) being provided with a friction roller (j^2) which bears on the periphery of a cam (k^2) on the main cam shaft (l^2), which cam, at the time the fingers are to be drawn forward, elevates the lever that the small weight in front may draw the fingers forward, and so soon as the cam has passed the arm (i^2) the weighted lever (h^2) is free to descend and draw back the fingers.

As before stated there is one set of such stationary and movable fingers on each side of the reed, with the connecting parts for operating the movable fingers. The two cams (k^2 k^2) are placed on opposite sides of the main shaft which makes but one revolution to two of the lathe shaft (m^2) and, hence, one set of movable fingers is operated at each beat of the lathe, and the positions of these cams relatively to the cranks (n^2) which operate the lathe must be such as to permit one set of movable fingers to be started forward just after the lathe has commenced its forward movement; but, as they are drawn forward by the gravity of a weight, they pass and complete their movement before the lathe, and, by this means, draw the weft thread tight against the woven cloth before it is beaten up by the lathe. And on the back movement the movable fingers do not start back until after the lathe has commenced its back movement for the purpose of holding the weft thread that it may not be drawn back by the back motion of the lathe; but the cam passes directly after the lathe has commenced its back movement, and then the back weight moves them back so much faster than the back movement of the lathe that they reach the end of their back movement in time for the throw of the shuttle.

The stationary fingers stand in a plane forward of the plane of the reed at the end of its forward movement; and, hence, when the movable fingers draw the weft thread forward and grasp it against the stationary fingers, they draw the slack out of the weft thread and thus give the required tension to the weft to form a good selvedge.

If the weft thread, however, has not been carried across, the movable fingers enter between the stationary fingers before the lathe completes its forward movement. The straps by which the movable fingers are drawn forward are slotted to embrace arms (o^2) on a rock shaft (p^2) which shaft has another arm (q^2) with a catch (r^2) to hold an arm (s^2) of another rock-shaft (t^2) around which is coiled a helical spring (u^2), the said rock-shaft being provided with another arm (v^2) which bears against the shipper lever (w^2) so that when either of the arms (o^2) is depressed by one of the straps, whenever, by the absence of the filling or weft, they are permitted to move forward sufficiently for this purpose, the arm (s^2) is liberated and the tension of the helical spring starts the shipper to shift the belt from the fast to the loose pulley to stop the loom before the end of the beating-up motion of the lathe. In this way the movable fingers answer the threefold purpose of drawing the weft thread tight before the beat of the lathe—of holding the weft thread in place during part of the back movement of the lathe, to prevent injury to the selvedge—and of stopping the loom before the lathe beats up whenever the filling fails or is not carried across. The two first purposes of the fingers moving independently of the lathe could not be effected by any known arrangement, if the gripping fingers or grids were attached to and operated with the lathe.

I have thus fully described and represented the mode of applying the principle of the various parts of my invention which I have essayed with success; but I do not mean to confine myself thereto as the mode

of application may be greatly varied without changing the principle of my invention in any particular.

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

1. Regulating the delivery or giving out of one or more warps or chains by the separate tension of each, substantially as specified, in combination with a ground or controlling warp which determines the length of cloth made at each beat of the lathe by having the delivery of the said ground or controlling warp regulated by its tension and controlled by a break or the equivalent thereof when the lathe beats up, substantially as specified.

2. I also claim the employment of an index wheel or measuring apparatus or the equivalent thereof to indicate the length of figuring warps given out or taken up in the process of weaving, substantially as and for the purpose specified, when this is combined with an index or measuring apparatus to indicate the amount of cloth woven, substantially as and for the purpose specified.

3. And lastly I claim the employement of fingers moving or vibrating independently of the lathe, substantially as and for the purpose specified.

E. B. BIGELOW.

Witnesses:
ALEX PORTER BROWNE,
CAUSU. BROWNE.