

J. Gledhill,
Power Loom,

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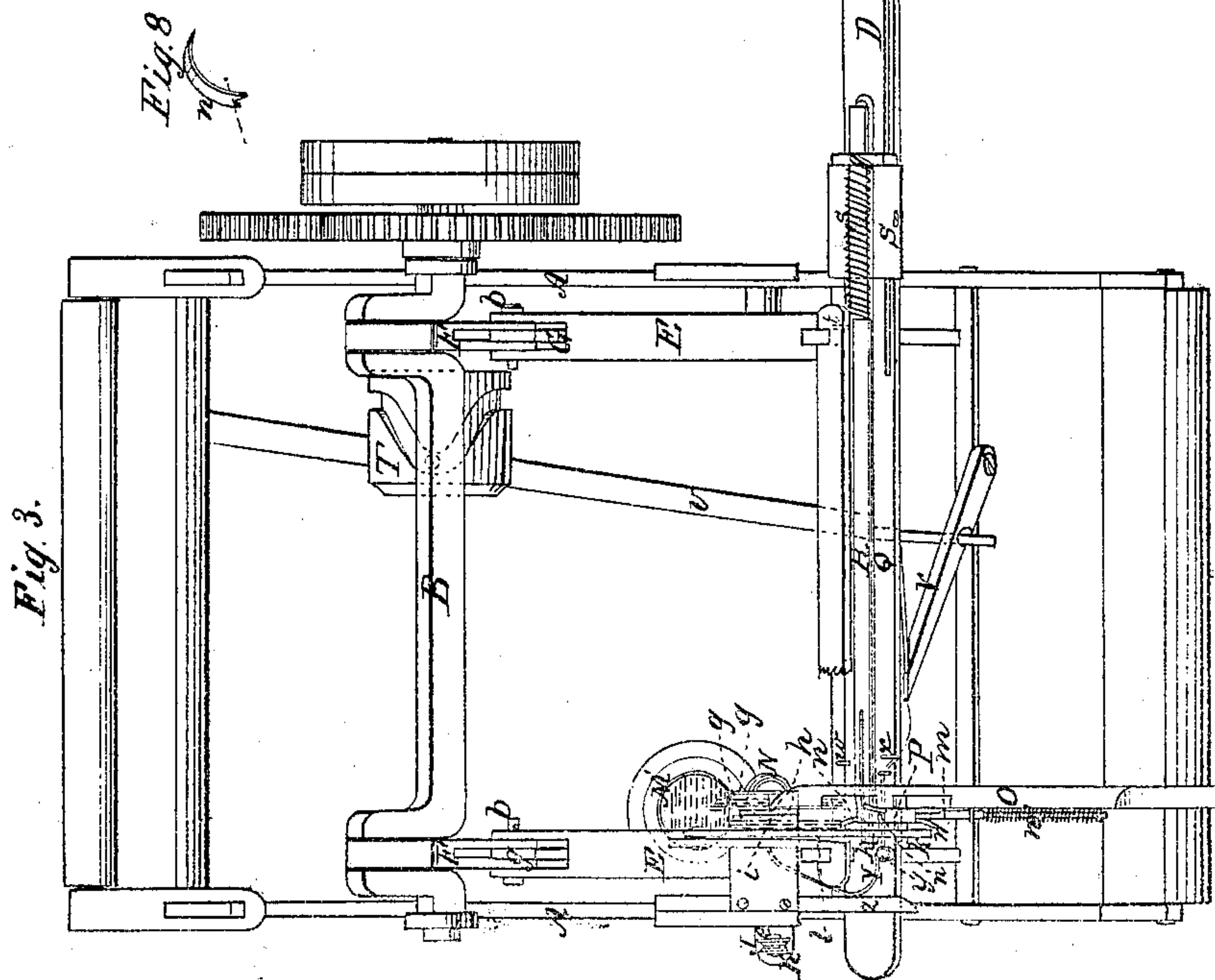
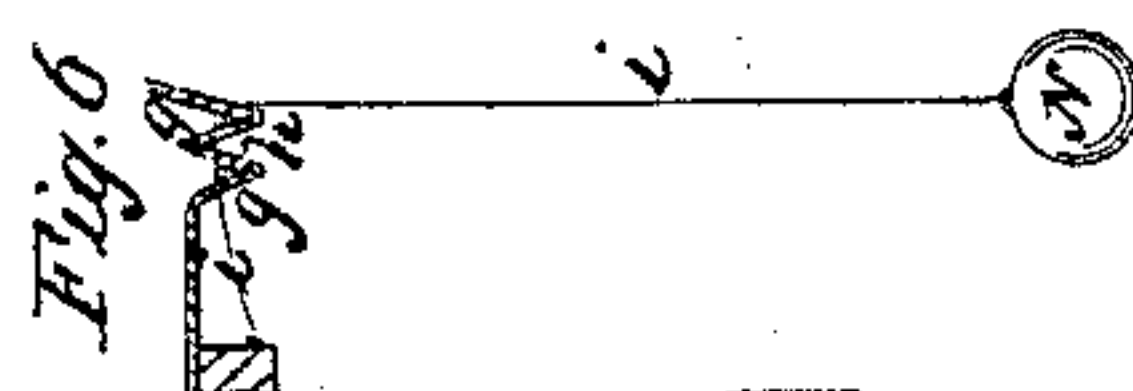
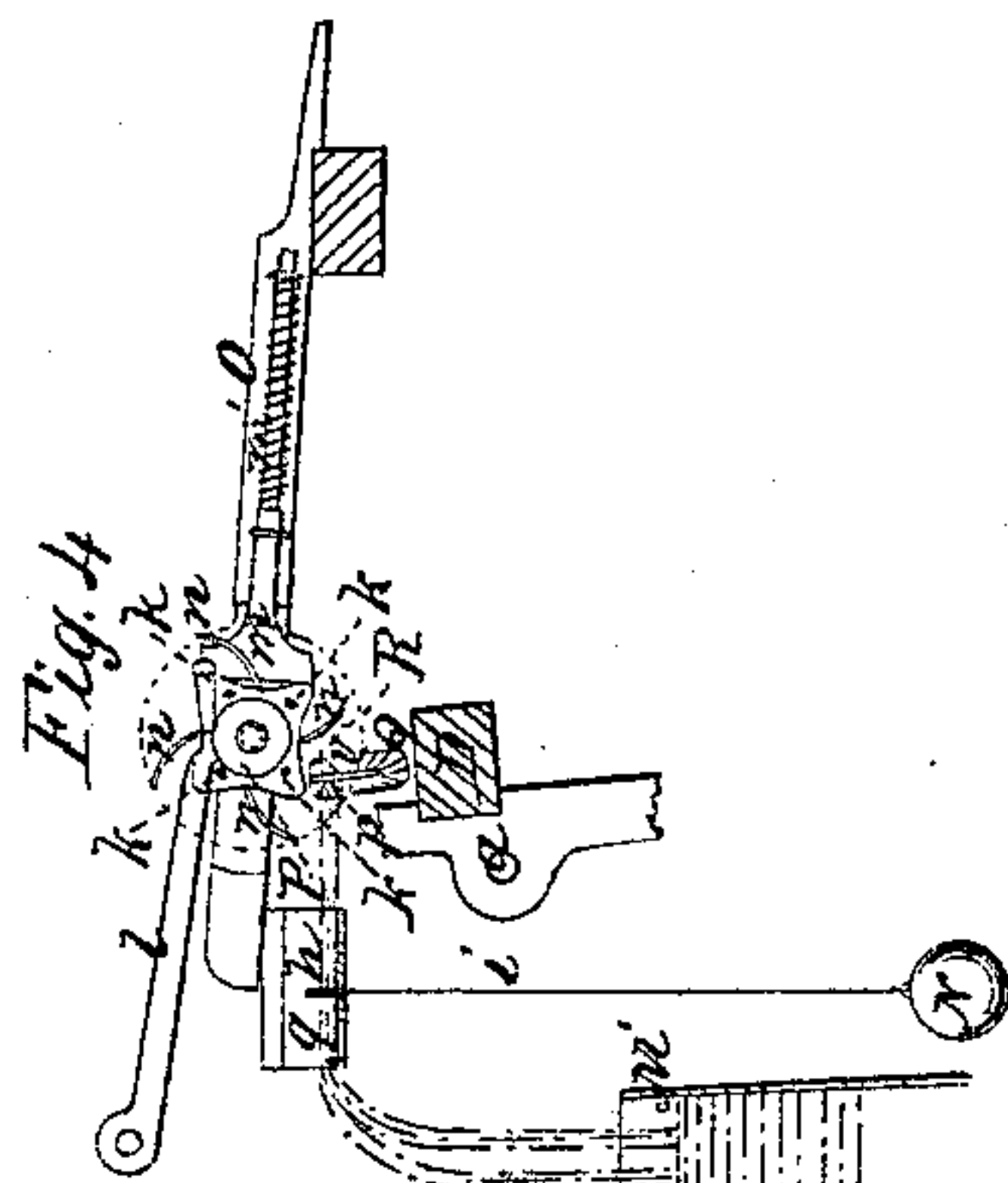
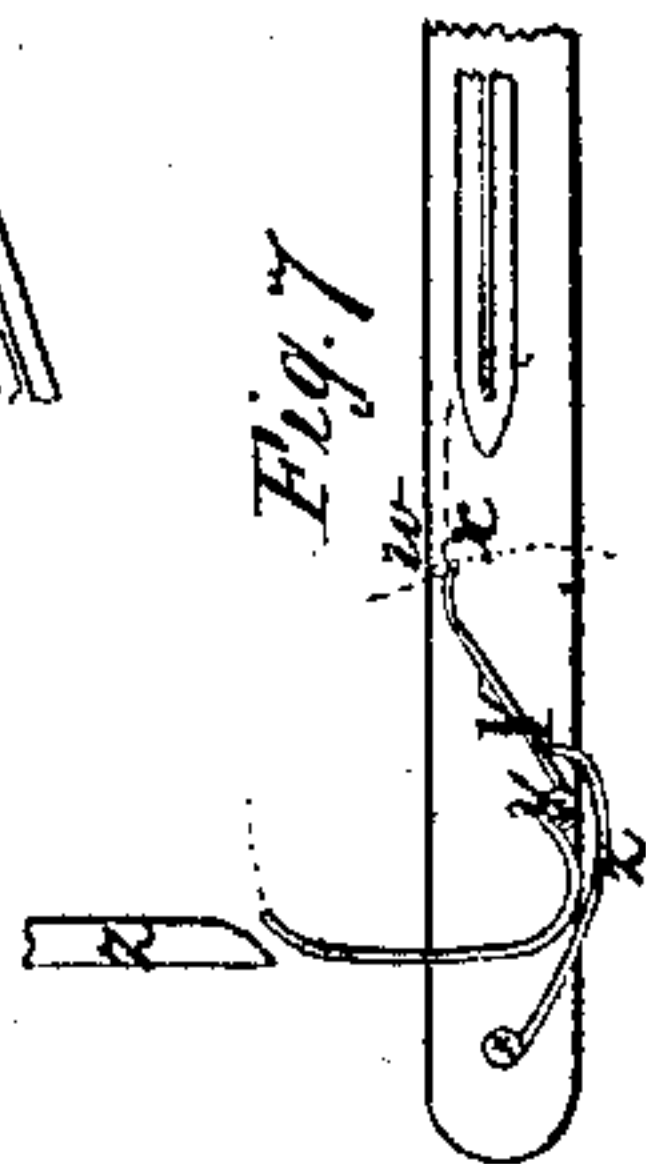
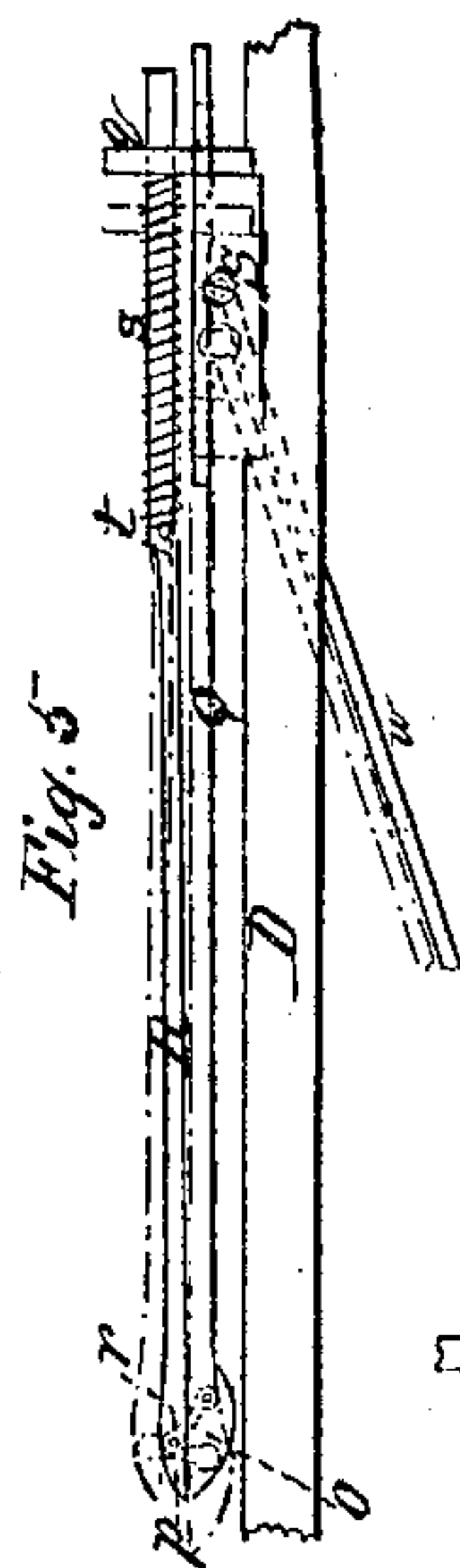
Patented Nov. 15, 1853.



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UNITED STATES PATENT OFFICE.

JOHN GLEDHILL, OF NEW YORK, N. Y.

IMPROVEMENT IN POWER-LOOMS.

Specification forming part of Letters Patent No. **10,223**, dated November 15, 1853.

To all whom it may concern:

Be it known that I, JOHN GLEDHILL, of the city, county, and State of New York, have invented certain new and useful Improvements in Power-Looms; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a front elevation of a power-loom constructed according to my improvements and intended for weaving hair-cloth. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a plan of the same with the top part of the framing and the harness-motion omitted. Fig. 4 is a side view of certain parts of the same intended to illustrate the operation of what I term the "automatic server." Fig. 5 is a front view of the filling-nippers which draw the weft through the warp. Fig. 6 is a front sectional view of the double hopper which contains the hairs for the weft. Fig. 7 is a plan of what I term the "drag" for keeping proper tension on the hairs of the weft while they are being filled in. Fig. 8 is an enlarged view of one of the serving-hooks.

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

The improvements which constitute this invention are for the most part intended only to be applied to the weaving of hair-cloth (which I believe has never before been successfully woven by a power-loom) or of any material of a similar character—that is to say, a material whose weft is not continuous, but is composed of a number of detached threads; but certain of these improvements are applicable to any power-loom. By their use the following results are obtained in weaving hair-cloth: First, the quantity woven in a given time is increased; second, only one attendant is required for two looms, two attendants being required with every one of the present looms; third, the stock is economized, and, fourth, the quality of the manufacture is improved.

The first part of the invention relates to the lay-motion and is applicable to looms of every description. It is desirable in all looms to allow as much time as possible for the passage of the shuttle or other device which car-

ries the weft through the shed. This is more particularly the case in weaving hair-cloth, as the device which takes the hair must pass through the shed and return while it is open. Time may be gained for this purpose by allowing the lay to be kept back as long as possible in the widest part of the shed.

The nature of this part of my invention consists in transmitting motion from the cranks to the lay by jointed connecting-rods, or connecting-rods formed in two pieces, one of which is connected to the lay and the other to the crank and both connected together by a suitable joint, and in connecting them at the joint with a radius-rod capable of working freely on a fixed center. By this means I am enabled to retard the latter part of the motion of the lay in going back and the first part in beating up, and the lay is thus kept longer in the wider part of the shed.

The other parts of my invention are only applicable to the weaving of hair-cloth and other materials of a similar character with a continuous warp and a weft composed of detached threads. In weaving hair-cloth in the common way the hairs require to be laid in such succession that the root end of one hair will be next the point of the other, owing to the difference in the thickness of the two ends, and hence the hairs are held in two bunches by the left hand of an attendant, termed a "server," one bunch having the roots and the other the points convenient to be seized by the right hand, to be placed in the open sheds in proper succession. Each hair when entered in the shed is seized with a suitable instrument by the "tender" on the opposite side and drawn through when the lay is beaten up. I propose to perform the whole of these operations by self-acting machinery, by which I can use hair or filling-threads from any number of bunches.

The second part of my invention consists in what I term the "automatic server," which is a block or head fitting so as to turn freely on a pivot in an arm attached to the breast-beam of the loom-frame, or to any other convenient part thereof, and having a series of hooks, which are formed to take one or more hairs or threads at a time, and are arranged in such a manner that when a proper motion is given to the head they will take the weft hairs or threads from the several bunches in

proper succession and bring them to a position to be taken by the instrument which draws them through the open shed.

The third part of my invention consists in a pair of nippers so constructed and operated as to pass through the shed from the opposite side to the side where the hairs or threads are in readiness to be taken by them to seize the weft hair or thread from the server and to return through the shed with the hair or thread, which it lays across the shed and leaves therein as soon as it is beaten up.

The fourth part of the invention consists in what I term a "drag" for producing a proper tension on the weft hairs or threads to keep them straight while being drawn through the shed. This drag is attached to the lay and is composed of a movable finger and a fixed stud, between which the hair or thread is slightly pinched by the action of a spring on the finger, the finger having such a motion as will allow it to work clear of the nippers as they pass forth and back through the shed.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The frame A and the arrangement of the crank-shaft B, harness-shaft C, lay D, and the yarn and cloth rolls are the same as in most other power-looms.

The arrangement for transmitting motion from the cranks to the lay is best shown in Fig. 2. The connecting-rods consist each of the main rod E, which is the longest part, and is attached to the lay by a pivot *a* and the link F, which connects with the crank, the main rod and link being connected together by a pivot *b*, which serves also to connect the radius-rod G, which works on the fixed center pin *b'*.

The operation of the parts may be perfectly understood by the pale gray lines in Fig. 2, which indicate the revolution of the crank, the movements of the pivots *a* and *b* and crank-pin *c*, and the positions of the parts at the end of the stroke and the half and back quarter revolutions of the crank.

The proportions shown for the various parts make the lay perform only one-eleventh part of its movement during the back quarter-revolution of the crank and about two-fifths during the back half-revolution; but by shortening the link F the back part of the motion of the lay may be still further retarded, the shortest motion being obtained by giving the link F the same radius as the crank. The movement given to the lay is the full throw of the crank, the effect of the link and radius-rod being to increase the speed during the forward portion of the motion, but to decrease it during the backward portion, and thus to keep it longer in a backward position.

The loom represented requires only two leaves of harness; but that is sufficient to explain my improvement in the harness-motion. Each leaf is suspended at the extremities of

two cords *d d'*, of which *d* is attached to the right-hand end of both leaves and *d'* to the opposite end, the said cords passing over pulleys H H H', which work at the back of the top rail I of the frame and around the pulley J, whose axle is in the upper end of a rod K, which works vertically in guides *e e* outside the frame. The rod K has a spiral spring *f*, applied to it in such a manner as to draw it downward. The bottoms of the leaves of the harness are attached to treadles L L, which are moved by cams M M on the shaft D in a well-known way. One harness is always caused to rise by the cords *d* and *d'* when the other is depressed by the treadles, and thus both are balanced, while a proper tension is preserved on each by the action of the spring *f* in drawing down the pulleys, both being kept at all times perfectly steady and free from jumping.

The hopper in the loom shown requires only two compartments—one for that bunch of hair which is to be passed root end first through the warp and the other for the bunch to be passed through point or thin end first. It may be formed of sheet or cast metal or wood, and is attached to the left side of the frame, consisting of two V-shaped troughs *g g*, arranged parallel with each other side by side longitudinally to the loom and having open ends. A narrow slit *h* (see Figs. 2 and 4) is made transversely across the bottoms of both, extending nearly to the top. The hair (shown in blue in the drawings) is kept partly in a barrel or upright cylinder or pot M of water, (as is always the case in weaving hair-cloth,) with the parts near the ends lying in the trough *g g*, the ends protruding through the front of the trough. A cord *i*, which is attached to the frame at the side of the troughs, passes through the slit *h* above the bunches of hair and has a weight N suspended to it, which keeps the hair tight in the trough and forces it toward the bottom.

Attached to the breast-beam of the loom and extending back is the arm O, which carries the automatic server. This arm O is better to be made of metal and should be attached to the beam in such a way as to be adjustable back and forth. It may also be adjustable sidewise.

The head P consists of a square block of wood or metal, which is pivoted at its center to one side of the arm, and has on one face four studs *k*, one of which is caught and acted upon by a hook *l*, attached to the lay, every time the lay recedes in such a manner as to make it perform one-quarter of a revolution, being prevented from turning farther through any shock by a spring bearing-piece *m*, which is forced against the back side by a spiral spring *m'*, the spring yielding to the operation of the hook *l*, but preventing the head being turned accidentally.

On each of the four sides of the head P there is a serving-hook *n*, which consists of a curved piece of steel secured at one end to

the head in any convenient way, and having a V-shaped notch at its other extremity. These hooks require to be alternately at opposite ends of the head, or so arranged that their notches are opposite the centers of the troughs g of the hopper, the order of succession being such as may be required, according to the nature of the fabric.

For weaving hair-cloth the hair requires to be taken from each bunch alternately, and thus the hooks require to be at opposite ends alternately. Every time the lay recedes the hook l turns the head P , and one of the serving-hooks n takes a single hair in its notch and draws it forward from the bunch to such a position that the nippers will seize it. This is illustrated in Fig. 4, where the server is supposed to have just operated and the nippers to have just arrived in position to receive the hair v , when they close. For some kinds of work it may be necessary to take two or more hairs or threads at a time, and then the serving-hooks would be made with two or more notches; but when only one hair or thread is required the serving-hook should have only one notch, whose shape should be such as could not take more than one hair. If the center of the notches in the hooks be opposite the centers or vertices of the troughs g , the hooks will never fail to take a hair as long as one remains in their respective troughs. It may be well to observe that in order to prevent the hair caught by the hooks from slipping out I raise a bulb or knob on every hair before using it; but as this forms no part of the present invention it is not necessary further to describe it.

The nippers by which the hairs are pulled through the warp consist of two long rods Q R , terminating in jaws o p . These bars must be long enough to extend clear through the warp and leave the jaws protruding on one side and a considerable portion of their length on the other. As it is desirable that lightness and stiffness should be combined, wood is the best material for the nippers, the jaws being faced with metal. The right-hand end of the lower rod Q , or the opposite end to the jaw, is rigidly attached to, though it may be adjustable on, a block S , which is capable of sliding on the lay-sole. The right-hand end of the upper rod works freely through a guide q , attached to the block S , and is connected near the point of the jaw by a radius-link r . (Shown in dotted and also in red lines in Fig. 5.) It has a spring s , coiled round it within the guide q , which always tends to close it, and on its back side it has a stud t projecting from it, whose position is shown in Figs. 1 and 5. The nippers are caused to pass quickly through the open shed while the lay is finishing its backward motion, and to take the hair v , which is held in readiness by the server, and return with it through the warp by a transverse motion given to the block S by means of a cam T on the harness-shaft, which acts upon a hori-

zontally-vibrating lever U , whose front end operates on a picker-staff V , which is pivoted in front of the lay and connected with the block by means of a connecting-rod u , working through a slot in the lay-sole. While the nippers are passing through the shed to the left side to fetch the filling they are kept closed by the spring s until the points of the jaws have passed through the shed and have arrived opposite the server, when the stud t comes in contact with the right-hand sword of the lay or with any suitable stop, and thus the traverse of the upper part of the nippers is arrested. This stop takes place when the block S has nearly arrived at the end of its traverse; but the continued motion of the lower jaw causes the upper one to be raised by the radius-link r , as may be understood by Fig. 5, where the nippers are shown closed in black and opened in red. When the nippers are wide open, one jaw is above and the other below the hair v . As the block S commences traversing back to the right the jaw p is allowed to descend, in doing which it knocks the hair down from the notch in the serving-hook, and when it comes quite down it grips the hair, carrying it through the warp as it continues its backward traverse. The nippers do not relinquish their hold of the hair until the warp has beaten up the weft and the shed is closed, when, the closed shed holding it firmer than the nippers, they slip off. If, however, the nippers should not relinquish it readily enough, a fixed wedge may be applied at the breast-beam, which may be made to open them as the lay beats up. The drag by which the weft hairs or threads are kept at a proper tension is placed near the left-hand end of the lay-sole. The fixed stud w is placed in an upright position near the edge of the warp at the back of the lay-sole. The movable finger x stands upright and is attached to one end of a small lever Y of the first order, which, together with the finger, may be made of bent wire with an eye made to fit a fulcrum-pin y . This lever is under the control of a spring Z , (see Fig. 7,) which when it is not otherwise influenced forces the finger x against the stud w . When the lay is moved back, the finger is drawn away from the stud to allow the nippers to pass between them by that arm of the lever on the opposite side of the fulcrum coming in contact with an arm z , attached to the frame for the purpose. As the nippers draw the hair into the warp it must pass in front of the stud w . The lay commencing to move forward at about the same time as the nippers commence to move back with the hair, causes the lever Y to work free of the arm z , and the spring Z throws the finger x against the stud w , pinching the hair gently between them. This drag only requires the hair to be long enough to protrude about half an inch at most on the left-hand side of the warp when drawn through; but a much greater length is required when the filling is put in by hand.

The nippers do not require so great a length of hair on the right side as is unavoidably wasted in filling by hand. The saving effected in the length of every hair of the filling is expected to be about an inch and a half.

The loom may be made double or with two warps filled by one server with a suitable number of series of hooks and two pairs of nippers filling in opposite directions.

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

1. The combination of the main connecting, rods E, links F, and radius-rods G, substantially as described, for giving the lay a motion, the forward part of which is accelerated and the backward part is retarded, for the purpose set forth.

2. The automatic server consisting of a block or head P, furnished with any number of hooks n or analogous devices arranged in any number of series according to the number of bunches of filling, hair, or threads and in order of succession, the said block or head being hung, substantially as described, on a pivot in such a position that when a proper amount of circular motion is given to it by suitable mechanism the hooks will withdraw

the hairs from one or other of the bunches and bring them to a suitable position to be taken by the nippers or other device, which draws them through the warp.

3. A pair of nippers Q R, which are operated by suitable mechanism, substantially as described, to make their jaws pass through the warp from one side thereof every time the shed is opened, seize one or more hairs or threads from the opposite side, and return through the open shed with the same and release the same when it is beaten up and the shed is closed.

4. The combination of the fixed stud w , finger x , lever Y, spring Z, and arm z , substantially as described, the stud, finger, and spring being for the purpose of producing a proper tension on the hairs or threads as they are being drawn through the shed, and the lever and arm being for the purpose of moving the finger to allow the nippers to pass in coming to fetch the hairs or threads.

JOHN GLEDHILL.

Witnesses:

O. D. MUNN,
EL. POLHAMUS.