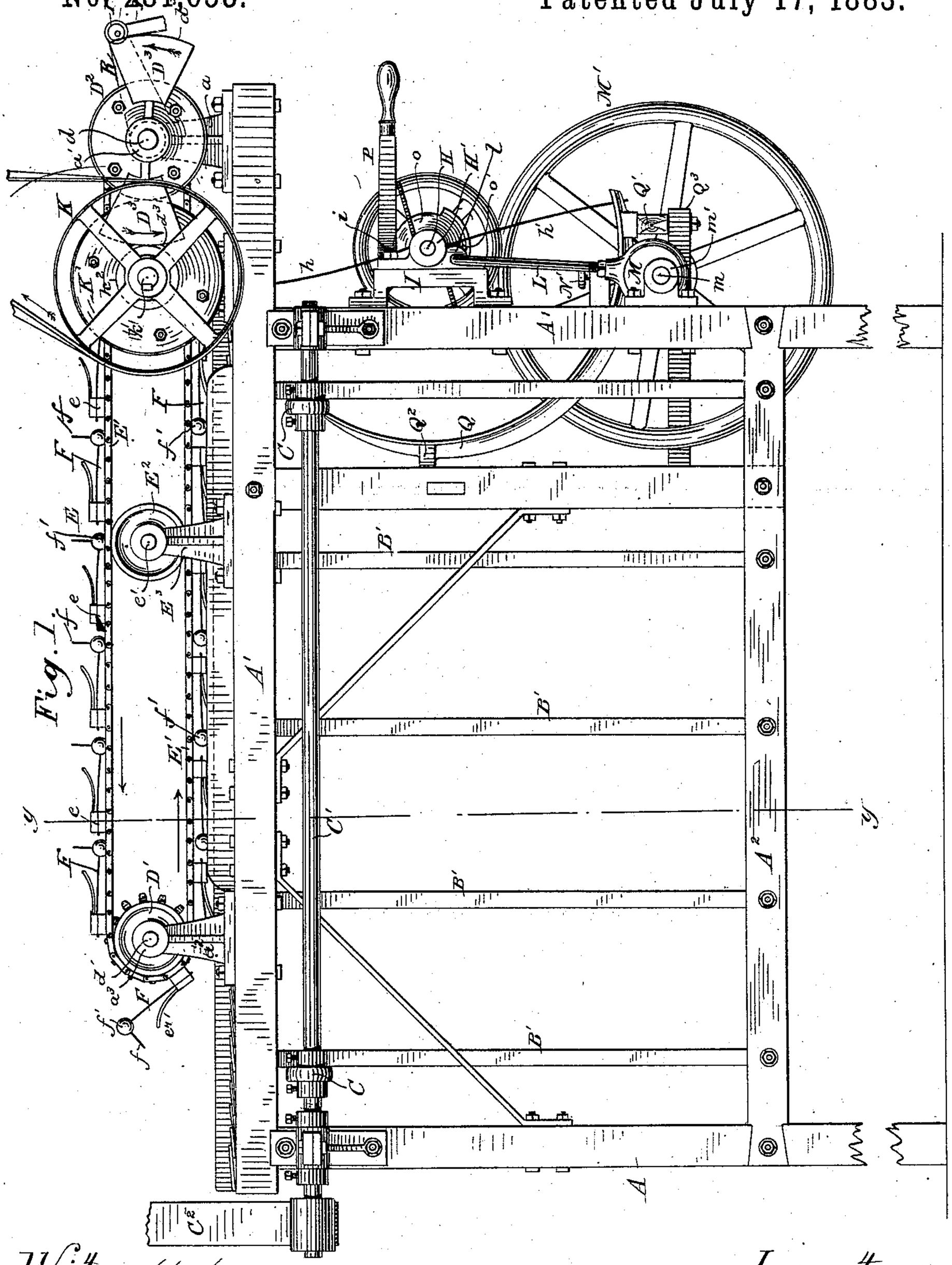
(No Model.) 5 Sheets—Sheet 1.

S. TURNER & G. B. DURKEE.

MACHINE FOR STRINGING BARBS UPON WIRES.

No. 281,653. Patented July 17, 1883.



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(No Model.) 5 Sheets—Sheet 2.

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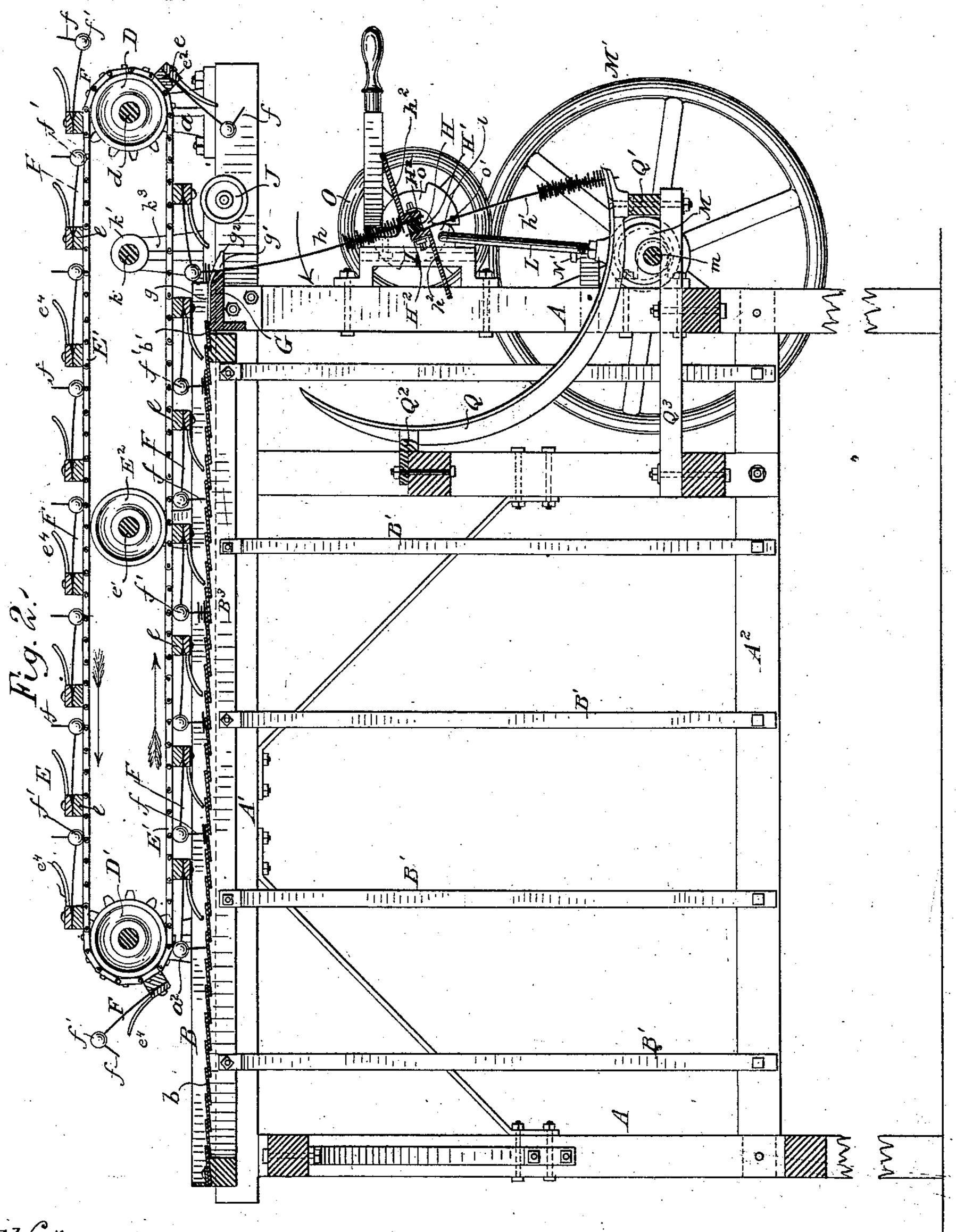

Fig. 2.

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MACHINE FOR STRINGING BARBS UPON WIRES.

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Fig. 5

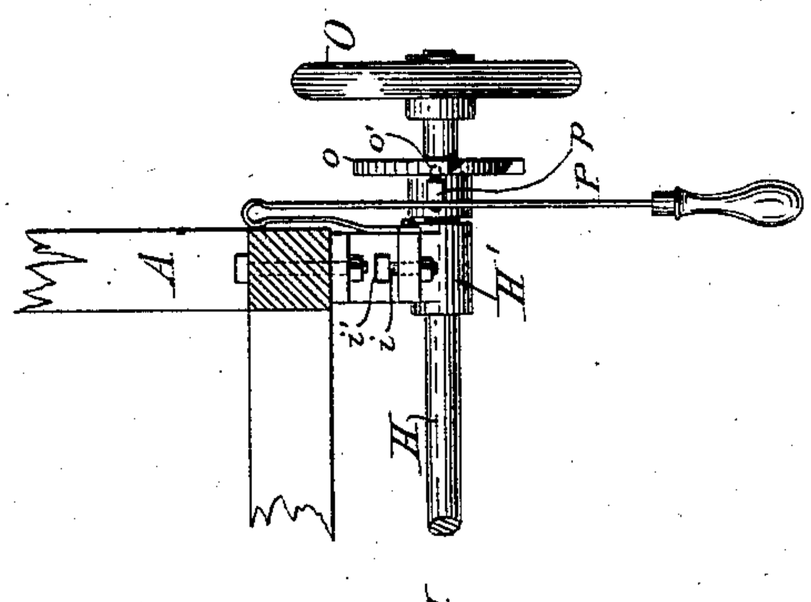


Fig. 6.

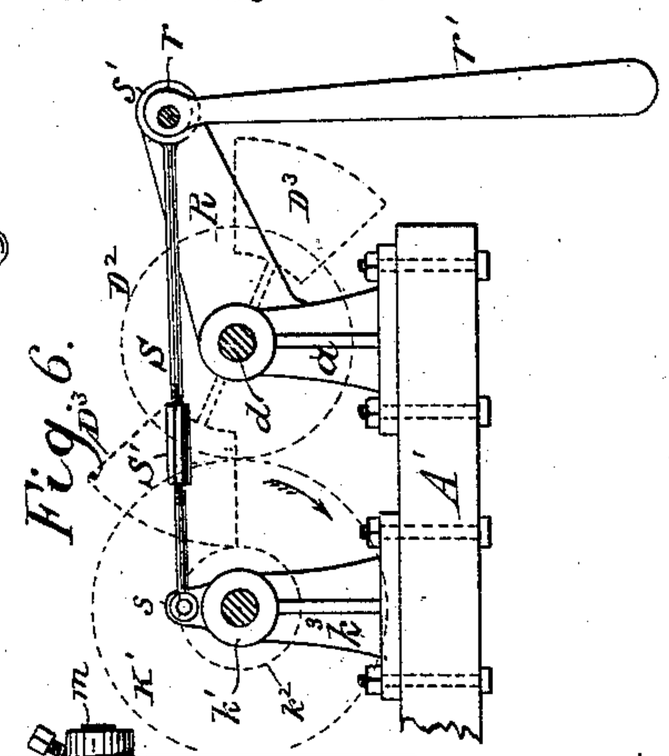
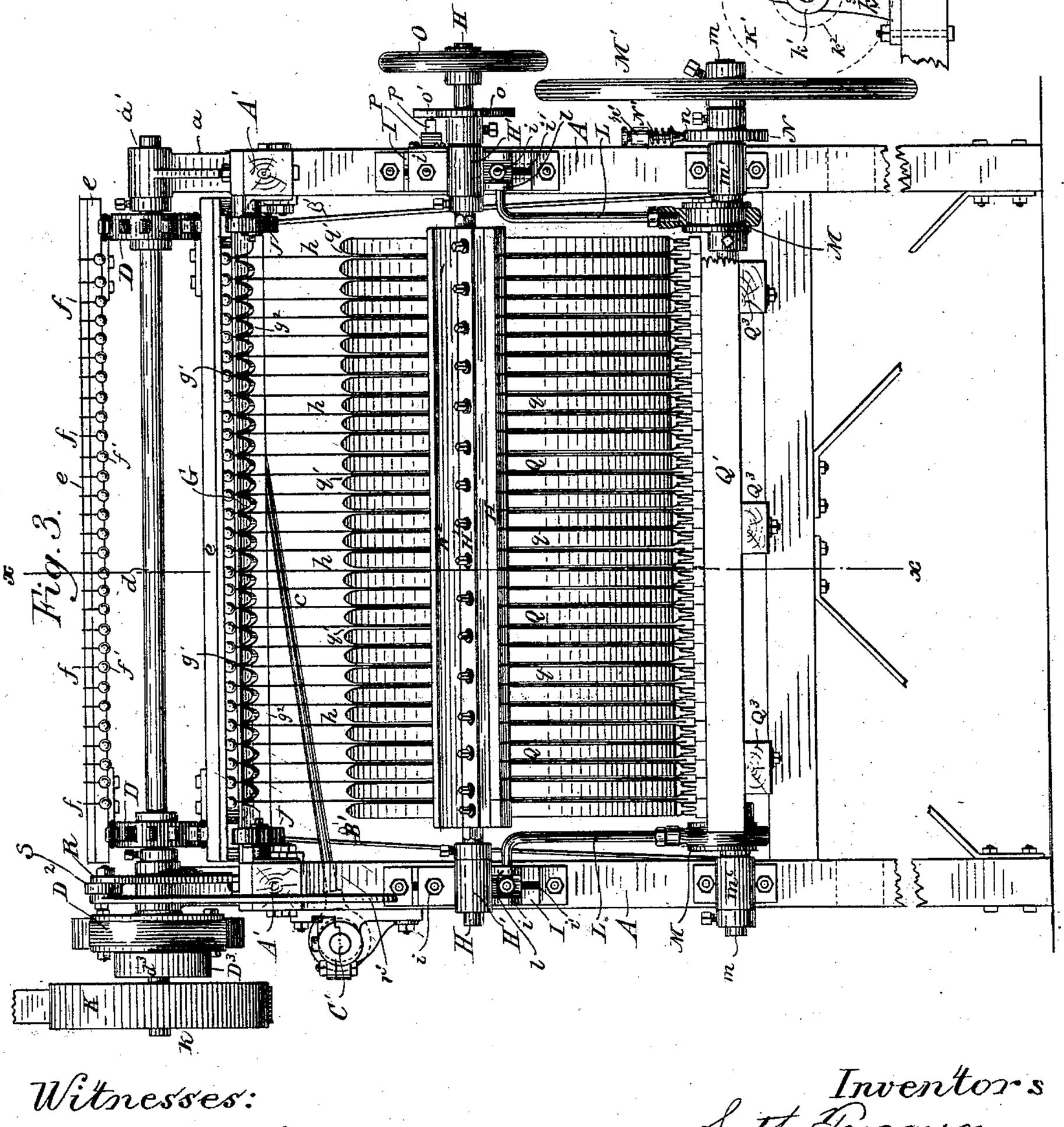


Fig. 3.



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MACHINE FOR STRINGING BARBS UPON WIRES.

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Fig. 4.

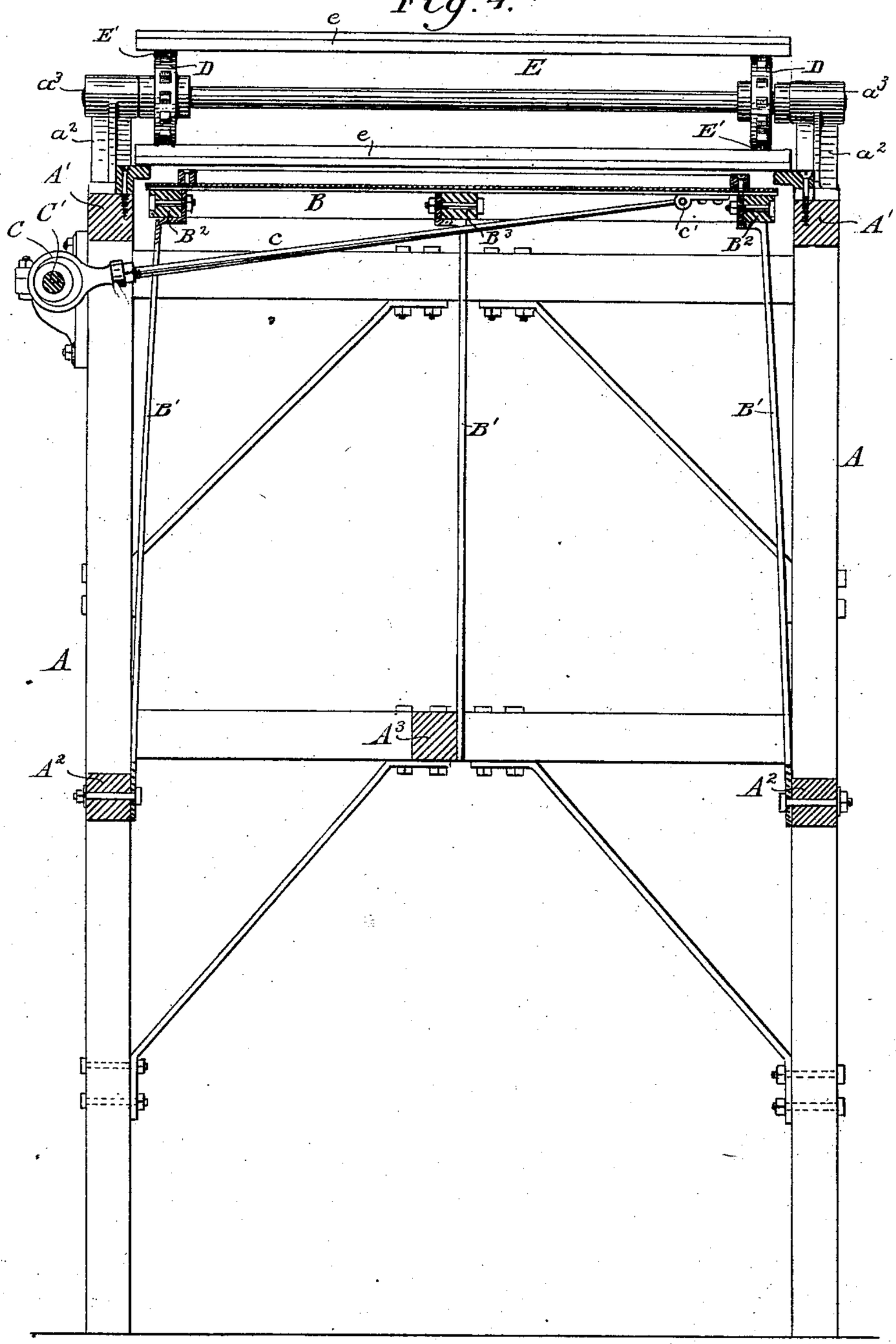

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Fig. 10.

Fig. 7.

Fig. 8.

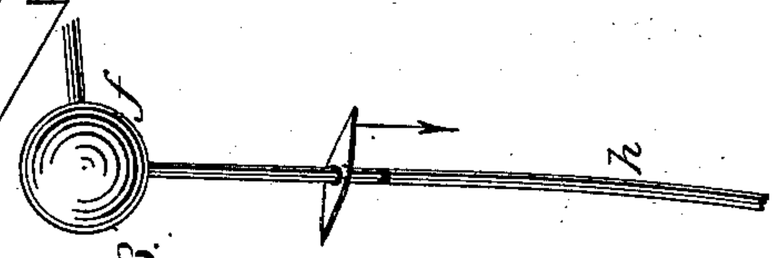
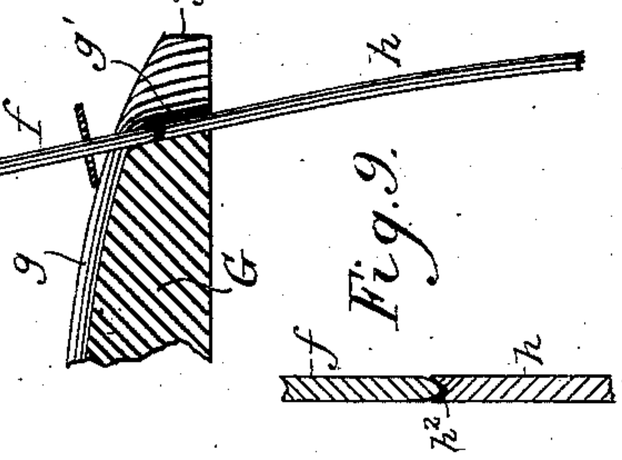


Fig. 9.



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UNITED STATES PATENT OFFICE.

SETH TURNER AND GEORGE B. DURKEE, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE THORN WIRE HEDGE COMPANY, OF SAME PLACE.

MACHINE FOR STRINGING BARBS UPON WIRES.

SPECIFICATION forming part of Letters Patent No. 281,653, dated July 17, 1883.

Application filed December 2, 1882. (No model.)

To all whom it may concern:

Be it known that we, SETH TURNER and GEORGE B. DURKEE, of the city of Chicago, in the county of Cook and State of Illinois, have jointly invented certain new and useful Improvements in Machines for Stringing Barbs upon Fence-Wires; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to the manufacture of that class of barbed wires in which the barbs are centrally apertured and are strung upon the fence-wire by being passed over its end, and thereafter distributed and secured at proper intervals in one of several ways. More particularly, it relates to machines for stringing the barbs upon the fence-wire or upon other wires or needles preliminary to their transfer to the fence-wires, upon which they are finally to be secured; and it consists in the matters hereinafter described and claimed.

In the manufacture of barbed fence-wire having the barbs applied in the manner described it has heretofore been the practice to string the barbs by hand. This has been done usually by sharpening a number of short wires—say about two feet long—called "needles," and, while holding them in a group or bundle by their unsharpened ends, thrusting their sharpened ends horizontally and repeatedly into a mass of barbs until a considerable number of barbs have been accumulated on the several needles. Afterward the end of each needle is held against the end of the fence-wire to which the barbs are to be transferred, and the barbs allowed to slip from the needles to said fence-wires.

The object of this invention is to provide a machine for doing this work of stringing the barbs.

In the drawings, Figure 1 is a side elevation of the machine. Fig. 2 is a longitudinal cross-section thereof upon the line *x x* of Fig. 3. Fig. 3 is a front elevation of the machine. Fig. 4 is a transverse vertical cross-section on the line *y y* of Fig. 1. Figs. 5, 6, 7, 8, 9, and 10 are views of details which will be referred to in the description.

The essential features and mode of operation of the machine will first be briefly described.

The loose barbs which are to be strung upon the fence-wire by this machine are generally flat diamond-shaped pieces of metal having each a central aperture. They are first thrown indiscriminately upon a vibrating table located at the top of the machine, which table has a transversely ridged or serrated surface. Over this table is arranged a broad carrier, consisting of two chain belts which pass over sprocket-wheels at each end of the machine, and cross-bars or travelers arranged at equal intervals on the belts and extending the full width of the table. These travelers move over the surface of the table, a short distance above it, in a direction transverse to the ridges or serrations upon its surface and to the direction of its vibration, and also in a direction from the rear toward the front or the delivery end of the machine. Attached to the travelers are a series of rearwardly-projecting hooks or wires, having their ends bent vertically downward, so that they rest at their points upon and are dragged over the serrations upon the table as the travelers move forward over the surface thereof. These wires or hooks are weighted near their outer ends, and are sufficiently flexible to allow the vertical points or fingers to follow the serrations upon the table. The serrated surface of the table is composed of a succession of easy inclines, which rise toward the forward end of the machine, alternated with short vertical faces, so that the end of the weighted fingers, in passing over the table from rear to front, will rise on each incline and then drop over the vertical face to the bottom of the next incline, and so on until the end of the table is reached. The transverse vibrating motion given to the table serves to distribute the loose barbs placed thereon evenly across the table, and to shake them down into the depressions between the ridges and next to the vertical faces of the table. The ends of the fingers, therefore, in dropping over the ridges, fall upon the barbs, and, as said fingers are dragged along, will catch in any apertures in the barbs which may lie in their paths. A finger, having caught a barb in this manner, will drag it forward over the next incline and

drop again over the next ridge on the barbs below, where it may encounter the aperture in another barb, which will be similarly caught and carried forward, and so on until the end of the table is reached, where each finger will have accumulated a number of barbs. The fingers are smaller than the holes in the barbs, and will drop freely when they pass the ridges, while the barbs thereon will be supported by the ridges until the end of the finger has moved forward sufficiently to allow the barbs also to fall. The barbs upon the fingers are thus held up out of the way and do not interfere with the action of the fingers in catching other barbs as they drop into the succeeding depressions of the table. Across the front end of the vibrating table is a plate having a series of transverse shallow grooves in its upper face, which the ends of the fingers enter after leaving the serrated portion of the table. These grooves terminate at the front end of the plate in a series of notches, in which rest the upper ends of a number of vertical steel wires or needles about two feet in length. These needles are concave or countersunk on their end faces, and are held by the notches in such position that the ends of the fingers, after passing through the grooves, drop into the cavities and draw the needles with them out of the notches. As soon as the fingers and needles thus engaged are freed from the plate the barbs which have accumulated upon the fingers, being unsupported, fall or slide down therefrom upon the needles with which said fingers are severally engaged. When the barbs are thus tranferred to the needles, the fingers are lifted out of the cavities in the ends of the needles by devices provided for the purpose, and the needles spring back into their respective notches, ready to receive other barbs from succeeding fingers. This operation is repeated until the needles have all been suitably filled with barbs, after which they are removed from the notches and replaced by the free ends of other similar needles. For the purpose of shifting the needle, as stated, said needles are clamped by their fixed ends to a horizontal rotating shaft or bar located at the front of the machine, a series of needles projecting on each of two opposite sides of the bar. The shifting is effected by the rotation of this bar one-half turn, which brings the loaded needles to point downward and the empty ones to point upward, with their ends in the notches referred to. As a means for preventing the escape of the barbs from the loaded needles when the bar is rotated, a number of guides are arranged in a section of a cylinder practically concentric with and at the rear of and below the needle-bar mentioned, said guides having vertical grooves between them, in which the ends of the loaded wires are directed in their descent. As the needles pass a horizontal position the barbs strike outward and downward against the guides, and are retained thereby from escaping from the ends of the needles. The loaded needles are brought to rest near the lower and forward ends of the guides at the same time that the empty needles are brought to place in the notches of the terminal table-plate, and the barbs are transferred from the loaded needles to the fence-wires in the manner hereinafter set forth.

In the accompanying drawings, A is the main frame of the machine, which is made of such a height that the barbs, when strung, may be delivered at a point convenient to the workman in transferring them to the fence-wires upon which they are to be fastened. At the top of the main frame, and between the longitudinal side pieces, A′ A′, is located a shaking tray or table, B, having a transversely serrated or ridged surface, upon which the barbs to be strung are indiscriminately thrown. The surface of this tray is composed of a series of transverse overlapping metal strips, *b b b*, forming a number of ridges or serrations, which consist of a series of inclined surfaces, b^2 b^2, and vertical or nearly vertical faces b^3 b^3. (More clearly shown in Fig. 7 of the drawings.) The serrated table is supported from the lower side beams, A^2 A^2, and also from a central longitudinal beam, A^3, by a number of vertical flexible metal strips, B′ B′, which are bolted at the lower ends to the beams A^2 A^3, and at their upper ends to the longitudinal framework B^2 B^2 and B^3 of the table. A transverse vibratory motion is given to the serrated table B, thus supported, by means of an eccentric, C, upon the shaft C′, and a connecting-rod, *c*, connected with an eye, *c′*, on the under side of the table B. The shaft C′ is driven by an independent belt, C^2. The object of this vibrating motion of the serrated table is to keep the loose barbs placed thereon evenly distributed, and to shake them down to the lowest points of the table next the vertical faces b^3, in order that they may be more favorably presented to the action of the devices for stringing them, hereinafter described.

Upon the front ends of the upper longitudinal side beams, A′, which project beyond the table and overhang the main frame, are bolted the standards *a a*, supporting the bearings *a′* *a′* of the shaft *d*, which carry the sprocket-wheels D D. Near the opposite ends of the side beams, A′, and near the head of the table B, are bolted corresponding standards, a^2 a^2, having bearings a^3 a^3 for the shaft *d′*, which carries the sprocket-wheels D′ D′. The sprocket-wheels D D and D′ D′ are of equal size, and operate an endless-belt structure or carrier, which, as a whole, is designated by the letter E. The carrier E consists of two chain belts, E′ E′, mounted each on opposite sprockets, D D′, and cross-bars or travelers *e e*, severally secured to both belts E′ at equal intervals. To prevent the sinking or sagging of this belt from its weight, smooth-faced wheels E^2 E^2 are mounted on the transverse shaft *e′* and placed in position to centrally support said belt, as seen in Figs. 1 and 2. The carrier E is ar-

ranged horizontally a short distance above and parallel to the surface of the serrated table B, so that the lower cross-bars or travelers, *e e*, when the carrier is moved in the operation of the machine, traverse the said table B at a short and uniform distance above it. To these cross-bars are attached devices for gathering the barbs, which, as stated, are loosely distributed on the table. As here shown, such devices consist of a series of flexible wires, F F, preferably of tempered steel, arranged to project rearwardly from the bars *e* when they are passing near the surface of the table, said wires being bent downwardly at about right angles near their ends to form substantially vertical fingers *f f*, whose free ends bear upon the table. As the carrier drags those hook-shaped wires along it is desired that the ends of the fingers shall follow the inequalities of the table-surface and drop abruptly at the faces b^3. For this purpose, weights *f' f'* are fastened to the wires at their angles. As here illustrated, the wires F are clamped to the cross-bars by strips e^2, held by screws e^3. The meeting faces of the bars and clamping-strips are rounded outwardly on that side from which the wires F emerge, in order that the latter may have no tendency to break by frequent and sharp flexure at this point. Of course the wires F, instead of being flexible, may be rigid and flexibly joined to the bars *e* in such manner as to have the desired limited movement.

The action of the fingers *f*, when drawn along the surface of the table, is as follows: The ends of the fingers rise upon each incline b^2, and drop from one incline to the next at the vertical faces b^3. The barbs being distributed against said faces b^3 by the vibration of the table, as described, the points of the fingers strike upon the barbs, and in their forward movement catch into any of the apertures in the barbs which happen to lie in their path. Any barb so caught will be dragged along until the point of the finger, in falling over another ridge, encounters the aperture of another barb, which it will also catch and carry along, repeating the operation until the end of the table is reached. A number of barbs are thus caught upon each finger as it passes over the table, which, being constantly vibrated, continually moves the barbs in the depressions into new positions, and renders it more certain that each finger will catch other barbs as it follows in the path of its predecessor. It is found in practice that the vibration of the table B tends to cause the barbs to arrange themselves longitudinally or lengthwise upon the strips—that is, with their sides against or toward the vertical faces b^3—in which position there is a greater certainty that the fingers will fall upon the barbs and ultimately or immediately enter the apertures.

At the tail or foot of the table B is placed a stationary transverse metal plate, G, forming a continuation of the table, and, as here shown, also serving as a cross-beam of the machine-frame by being bolted to the opposite beams, A'. The front end of the serrated table B abuts immediately against the rear of the plate G, and the terminal strip *b'* of the series *b b* of the said table extends over and rests partially upon the rear upper surface of the said plate G, as shown in Fig. 7. This strip *b'* is to cover the joint between the vibrating table and the plate G, so that the fingers *f f* will pass from the table to the plate without being caught on the rear edge of the latter or in the space between the table and plate. The strip *b'* is attached to the frame of the table B, and slides upon the plate G as the said table is vibrated. In the upper surface of the plate G is a series of shallow grooves, *g g*, transverse thereto, and extending from the edge of the overlapping strip *b'* to the front edge of the plate. The grooves *g g* are arranged at the same distance apart as and in exact line with the points of the fingers *f f*. The front edge of the plate G is rounded or beveled off downwardly and forwardly, and the grooves *g g* terminate in or expand into V-shaped notches *g' g'*, divided by the projecting points g^2 g^2.

Below the plate G, and parallel to it, is located a shaft, H, journaled in vertically-movable bearings H' H' upon the frame of the machine. The shaft H is square in its central portion, and to it are clamped, in transverse grooves on each side of it, two rows of steel needles, *h h* and *h' h'*, which project in opposite directions, like the teeth of a double-toothed comb. These needles are arranged at the same distance apart as the fingers *f f*, grooves *g g*, and notches *g' g'* in the plate G, and in exact alignment with them. The needles *h* and *h'* are about two feet in length, (more or less,) and have their upper ends countersunk or concaved, and said needles are adjusted upon the shaft H in such manner that their concaved or recessed upper ends lie within the notches *g'* of the plate G flush with or a little below the terminal surfaces of the grooves *g*, so that the fingers *f*, guided by said grooves, will drop into and engage the ends of the needles and draw them forward out of the notches. By this engagement, end to end, of the barb-gathering fingers with the needles described, the barbs accumulated upon said fingers slip down upon the needles as soon as the latter are drawn out of the notches and away from the plate G. In the drawings the series of needles marked *h* are represented as being held in place, as above described, with their upper ends in the notches of the plate G, the shaft H being turned and secured in position to cause the needles to press moderately against the plate in order that they may be held positively in place. The shaft H is preferably located forward of a vertical plane passing through the points in which the upper ends of the needles bear against the plate G, for the purpose of giving needles a somewhat backward incline, as shown, in order that the weight of a quantity of barbs accumulated upon said needles will tend to bear the latter against the plate rather than away from it, and to carry the

needles against the plate when said needles, having been drawn forward, are released from the fingers, as will be hereinafter described. The needles are fastened in the transverse superficial grooves upon the shaft H by means of clamping-plates H^2, bolted to the sides of the shaft over the ends of the needles. As here shown, the clamping-plates H^2 are constructed with broad flanges or shelves h^2, extending outwardly at right angles or nearly at right angles to the plane of the needles, and intended to catch any loose barbs that may be drawn off the edge of the plate G, or that may otherwise fail to be properly transferred from the barb-gathering-fingers to the needles.

In order that the needles may not be drawn unnecessarily far forward by the traveling fingers *f*, engaged therewith as described, means are provided for releasing said needles from the fingers as soon as the barbs have been transferred from the former to the latter. These devices operate by lifting the fingers upward out of the concavities in the needles, and, as here shown, consist in rearwardly and downwardly projecting arms or prongs e^4, attached, one at each end, to the several carrier-bars *e*, together with the roller projections J, attached to the frame, one at each side of the machine, in position to be engaged by said arms e^4 at the proper time, for the purposes stated. When the arms e^4 strike the rollers J, the carrier-bars *e* are rotated in such manner as to lift the rearwardly-projecting wires F and the fingers *f* therewith connected, and thus release the needles, which thereupon spring back into the notches of the plate G, ready to be engaged by a succeeding series of fingers *f*. In order, further, that the fingers *f* may more certainly engage with the needles and transfer the barbs to the latter, the speed of the carrier is retarded as the fingers approach the needles and during the period of their engagement therewith. This is accomplished by the following mechanism: A driving-shaft, *k*, is mounted on standards *k'*, secured to the beams A', said shaft being near and parallel with the sprocket-shaft *d*. The shaft *k* is extended beyond its bearing at one end, and on said end is provided with a driving-pulley, K. Between said pulley and the adjacent bearing the shaft is also provided with the fixed friction-pulleys K' and k^2, the latter of materially less diameter than the former. Opposite these unequal pulleys the shaft *d* is provided with the friction-pulley D^2, intended to engage with K', and the oppositely-arranged segments D^3 D^3, having bearing-surfaces d^3 d^3, intended to engage with the pulley k^2. The radius of either segment added to that of the pulley k^2 is slightly greater than the sum of the radii of the pulleys K' and D^2, so that when one of the segmental bearing-surfaces d^3 is engaged with the pulley k^2 the pulleys K' and D^2 are forced out of contact. The frictional bearing-surfaces of the pulleys D^2 and K' are perfectly smooth, being preferably faced with wood, in a manner common in the construction of friction-gearing, and it is only necessary to separate them very slightly in order to release them from engagement. No especial provision for a lateral movement of the bearings of the pulleys K' and D^2 is necessary in order to allow them to separate, it being found in practice that there is sufficient flexibility in the standards supporting said bearings and their connections to allow the very slight movement necessary to accomplish the result above described. When the pulley D^2 is revolved by the action of the pulley K', the segmental friction-surfaces d^3 are brought into opposition to the pulley k^2 twice during each revolution of the pulley D^2. As soon as one of the segmental surfaces d^3 comes in contact with the pulley k^2 the pulleys D^2 K' are forced apart, and motion is then given to the sprocket-shaft *d* by the pulley k^2 acting upon the segment D^3, and the speed of the sprocket-shaft *d* is reduced (during the time the pulley k^2 is acting upon the segment) in proportion to the relative difference in the radii of the pulleys D^2 K' and the pulley k^2 and segment D^3. The devices above described for producing a retarded motion of the carrier E are so adjusted in reference to it that the retardation of the motion of said carrier occurs only during the time when the fingers *f f* are descending the grooves in the plate G, and while they are delivering the barbs to the needles *h*. The carrier E may be caused to travel slowly for a greater or less distance, as may be desired, by varying the length of the arc faces of the segments D^3.

Upon the standard *a*, adjacent to the friction-pulleys described, is an arm, R, (seen in Fig. 6,) upon the outer end of which arm is pivoted an eccentric, *r*, provided with a hand-lever, *r'*. From a fixed projection, *s*, upon the adjacent bearing-box *k'* of the driving-shaft *k* extends a rod, S, connected by the strap *s'* with the eccentric *r*. The rod S is in two parts joined by a right and left threaded nut, S', by which the length of said rod may be nicely adjusted. The friction-gear herein described is set to stand normally out of engagement, but is brought into engagement by means of the eccentric-rod just mentioned. As the parts are here arranged, the friction-surfaces are out of contact when the lever is raised and are brought into engagement by lowering the lever *r'* into the position shown in Figs. 1 and 3. No special provision is made for the approach and recession of the shafts *d* and *k* by the operation of an eccentric, as described, since, as before stated, the standards which support said shafts and the overhanging parts of the beam A', to which they are connected, are sufficiently yielding or flexible to allow a small amount of movement necessary for this purpose. By means of the adjustable eccentric-rod S' any degree of pressure desired between the frictional surfaces may be obtained.

The shaft H is mounted in bearing-boxes H' H', one at either side of the machine, which bearings are adapted to move vertically by sliding

upon the slotted guide-pieces I I, bolted to the vertical side posts of the main frame A. The boxes H′ are held upon the guide-pieces I by means of bolts *i i*, the heads of which slide in the T-grooves *i′ i′* in the said side pieces, as shown in Fig. 5. The bearing-boxes H′ are supported in place and are moved vertically upon the guide-pieces I by means of vertical eccentric-rods L L, connected to eccentrics M M upon the shaft *m*, parallel to the shaft H, and located some distance below it. The shaft *m* is journaled in bearings *m′ m′* upon the side posts of the frame A, and is revolved by a hand-wheel, M′, upon one end of it. The eccentrics M are located upon the shaft *m*, just inside of the bearings *m′*, and the rods L are bent at right angles at their upper ends to pass through, and have pivoted connection with lugs *l l* upon the lower portion of the bearing-boxes H′. Upon the shaft *m* is secured a disk, N, having a notch at *n* upon its periphery, which engages a spring-bolt, N′, sliding in a guide, *n′*, attached to the main frame. The notch *n* is so placed upon the disk that when the eccentrics M are turned to give their greatest upward throw and the shaft H is raised the spring-bolt N′ will enter the notch and lock the shaft in that position, thus preventing any accidental turning of the eccentrics and the consequent change of position of the shaft H. The shaft H is revolved by means of a hand-wheel, O. In order to lock the shaft H in such position that the needles *h* or *h′* shall remain in their proper positions in the notches *g g* while being filled, a spring-lever, P, is attached to the sliding bearing H′, having a detent-pin, *p*, which enters the holes *o′ o′* in the disk *o*, attached to the shaft H. The holes *o′ o′*, are located diametrically opposite to each other, and are so situated that the shaft will be held with either series of needles bearing with moderate force in the notches upon the plate G. This device is shown in detail in Fig. 5.

Behind and below the shaft H, and practically concentric with it, are a series of curved guides or strips, Q Q, separated by grooves *q q*, which are in the same vertical planes as the needles. The guides are placed at such a distance from the needle-shaft H that when said shaft is rotated the outer ends of the needles will pass downward through the several grooves. In this operation the guide-strips Q serve to support the barbs and prevent their escape from the needles. The upper end of each groove *q* is widened, as seen at *q′*, to facilitate the entry of the needles. The guides Q, as here constructed, are T-shaped in cross-section, and are fastened to cross-pieces Q′ and Q^2, attached to the frame of the machine. The lower and front ends of the guides Q extend forward of the main frame, so as to continue to support the barbs on the lowered series of needles after the latter are brought to rest, as seen in Fig. 2. The cross-piece Q′, which supports the lower ends of the guides Q, rests on arms Q^3, fastened to the uprights of the main frame. When the ends of either series of needles are in the notches *g′* of the plate G, and in a position to be filled, as described, the shaft H is in its elevated position. After the needles have been filled the eccentric shaft *m* is rotated, so as to lower the shaft H until the ends of the filled needles are brought below the plate G and are free to pass beneath it. The shaft H is then rotated to carry the filled needles backward into the grooves *q* between the guides Q, after which the said shaft H is again raised. A continued rotation of the shaft H in this position brings the series of empty needles into the notches *g′* and the filled needles to rest near the forward ends of the guides Q and in a position for being emptied, as shown plainly in Fig. 2. The barbs are transferred from the needles after the latter have been reversed, as just described, by first placing the end of a fence-wire previously sharpened for the purpose in the concavity of a needle, or end to end therewith, and then drawing the needle forward out of the groove *q* and far enough beyond the adjacent guides Q to allow the barbs to slide off the needle and upon the fence-wire. This work is rapidly performed by hand.

In the operation of the machine the barbs, as already stated, are spread loosely, but as evenly as convenient, upon the table B, near its head, and are distributed thereon both by its lateral vibration and by the action of the fingers *f f*, which drag them forward. In the constant passage of the fingers *f f* over the table many barbs that are not caught upon the fingers are carried off and over the plate G. The loose barbs thus carried over are caught by the shelves h^2, before mentioned, which form an inclined shield, by which they are held or made to fall inwardly upon the surface of the guides Q or beneath the machine, whence they may be gathered up and again placed upon the table B. By this means the falling barbs are prevented from interfering with the workman engaged in transferring barbs from the needles to the fence-wire.

It is not essential to the operation of the devices described for collecting the barbs from the table that such barbs should be delivered to the needles *h h′*, and thence transferred to the fence-wire, as above described, for they may manifestly be transferred directly to the wires themselves, provided the latter are suitably recessed at their ends to engage with the fingers *f*. For this purpose a number of fence-wires may be detachably held by clamps in place of the needles shown, or they may be otherwise supported in position to receive the barbs from the fingers *f*. The steel needles, however, as an intermediate means for stringing the barbs on the fence-wire, when controlled and managed as set forth, greatly facilitate the operation.

We claim as our invention—

1. In a machine for stringing barbs, the combination of a serrated table for supporting

the barbs to be strung, a wire arranged endwise to the surface of the table, and means for carrying the wire in this position along the serrated surface in a direction transverse to the ridges, substantially as described, and for the purpose set forth.

2. In a machine for stringing barbs, the combination, with the vibrating serrated table, of an endless-belt carrier moving transversely to the ridges of the table, and yielding fingers attached to the carrier and resting at their ends upon the table, substantially as described.

3. In combination with a table for supporting the barbs to be strung, and with traveling fingers for accumulating the barbs from said table, a series of receiving wires or needles adapted to engage end to end with the fingers, and means for supporting the needles in position to so engage the fingers, whereby the barbs may be transferred from the fingers to the needles, substantially as described.

4. In combination with the transversely-vibrating table, with the traveling barb-gathering fingers, and with the receiving-needles, a transverse stationary plate, forming a continuation of the table, provided with notches on its free edge to receive the ends of the needles, and with grooves on its upper surface to guide the fingers into engagement with the needles, substantially as described.

5. In a machine for stringing barbs, substantially as described, the combination, with the bars carrying the fingers, and with the receiving-needles fitted to engage the fingers end to end, of means for lifting the fingers out of engagement with the needles when the barbs have been transferred to the latter, substantially as described.

6. In a barb-stringing machine substantially as described, the combination, with the receiving-needles and with the traveling bars *e* of the endless-belt carrier, provided with rearwardly-projecting fingers F, of the trip-arms e^1 and a stationary tripping device, J, fixed to the frame, whereby the fingers are released from engagement with the needles, substantially as set forth.

7. In combination with the table, carrier, barb-gathering fingers, and receiving-needles, means for giving to the carrier an intermittently-retarded motion, whereby its speed is lessened during the transfer of the barbs from the fingers to the needles, substantially as described.

8. In combination with the driving-shaft *k*, provided with unequal friction-pulleys K′ k^2, the carrier-shaft *d*, provided with the pulley D^2 and segment D^3, opposed, respectively, to the pulleys K′ and k^2, substantially as and for the purposes set forth.

9. In combination with the shafts *k* and *d*, with their respective supports k^3 and *a*, and with the friction-pulleys K′ and D^2, mounted, as shown, to normally stand disengaged, the eccentric *r*, rod S, and lever *r*′, substantially as and for the purposes set forth.

10. In combination with the serrated table and a finger-carrier having movement in the direction indicated, a vertical and vertically-movable wire finger, *f*, provided with a weight whereby said finger is made to follow the surface of the table, substantially as described.

11. In combination with the serrated table and with the carrier-bars *e*, the flexible wires F, rearwardly projecting from the bars, the vertical fingers *f*, and the weights *f*′, substantially as described, and for the purposes set forth.

12. In combination with the table for supporting the loose barbs, with barb-gathering fingers, and with the needles adapted and arranged to receive the barbs from the fingers, means for reversing the needles and means for retaining the barbs when reversed, substantially as described.

13. In combination with the receiving-needles and with the stationary plate for supporting their free ends, the rotatable horizontal needle-shaft adapted to be vertically moved, whereby the needles may be bodily lowered and permitted to swing beneath the plate, substantially as described.

14. In a barb-stringing machine, the combination, with the rotatable shaft for sustaining the receiving-needles, of means for locking the shaft in a desired position, substantially as described.

15. In the machine substantially as described, the needle-shaft adapted to be rotated and provided with oppositely-projecting series of needles, substantially as and for the purposes set forth.

16. In the machine described, the combination, with the needle-shaft adapted to be rotated, as stated, and provided with one or more series of needles, of curved guides arranged as shown, and having intermediate grooves, whereby the barbs are retained upon the needles when reversed, substantially as set forth.

17. In combination with the rotatable needle-shaft H, a spring detent-lever, P, having a pin, *p*, and a disk, *o*, secured to the shaft, said disk having apertures arranged to receive the detent-pin at such points as to hold the needles in moderate pressure against the plate G, substantially as described.

18. The needle-shaft H, of sectionally-rectangular form, provided with transverse superficial grooves to receive the needles, in combination with a clamping-plate for holding the needles to the shaft, substantially as described.

19. In the machine described, the combination, with the needle-shaft, of the shelf h^2, substantially as described, and for the purposes set forth.

20. In combination with the needle-shaft mounted in vertically-movable bearings H′, the parallel shaft *m*, provided with eccentrics M and wheel M′, and the eccentric-rods L, pivotally connected with the bearings H′, substantially as described.

21. In a barb-stringing machine, receiving-

needles having their free ends concaved, in combination with barb-gathering fingers adapted to enter the said ends, substantially as and for the purposes set forth.

22. In a barb-stringing machine, the combination, with the table B and means for vibrating the same horizontally, of the elastic uprights B′, substantially as described, and for the purposes set forth.

23. In a machine for stringing barbs, the serrated table B, composed of metal strips arranged to overlap each other, and secured, substantially as described.

24. In combination with the reciprocating table B, fixed plate G, and traveling barb-gathering fingers, the strip *b′*, secured to the margin of the table and arranged to overhang the plate, substantially as described.

25. The method of stringing barbs upon fence-wire, which consists in first accumulating them upon wires, then transferring them to other wires, and finally transferring them from the latter to the fence-wire, substantially as described.

In testimony that we claim the foregoing as our joint invention we affix our signatures in presence of two witnesses.

SETH TURNER.
GEORGE B. DURKEE.

Witnesses:
JAMES BRECKENRIDGE,
MAX SONNENSCHEIN.