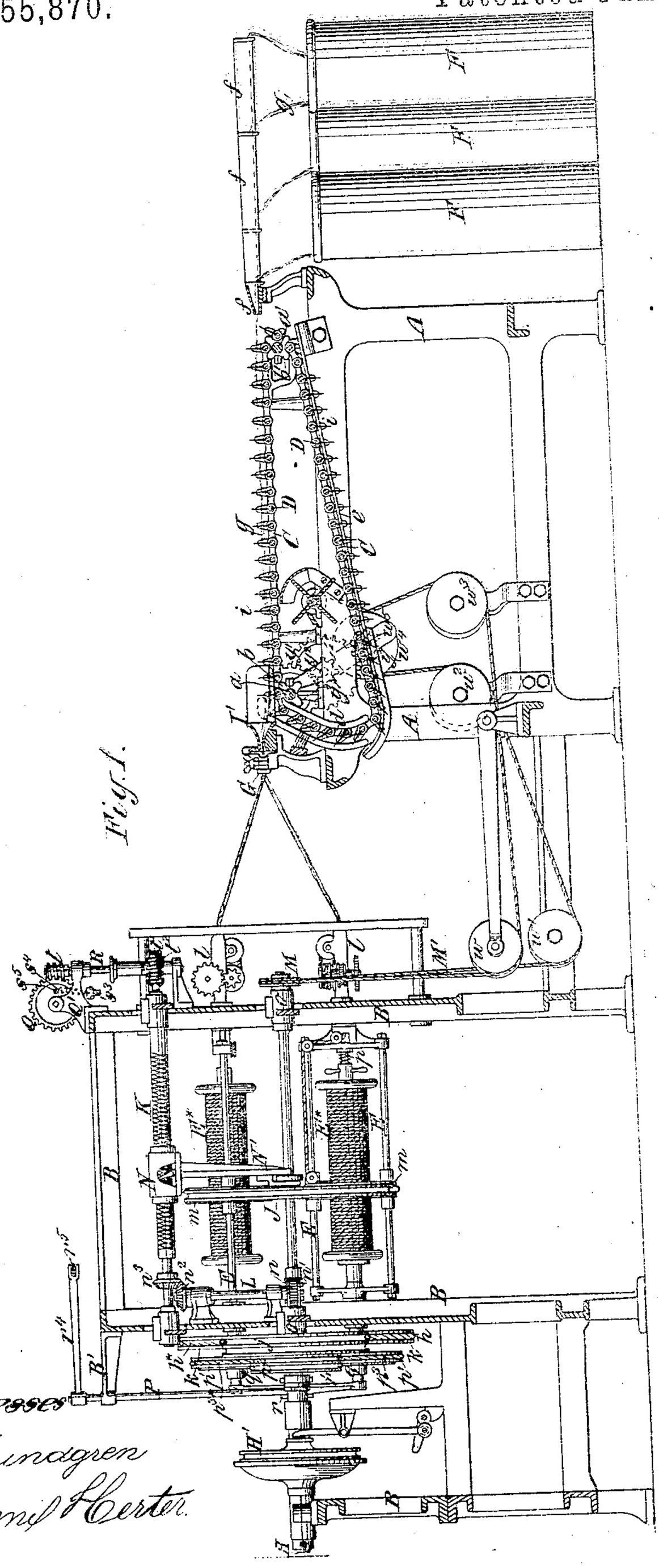
(No Model.) 3 Sheets—Sheet 1.

J. GOOD.

MACHINERY FOR DRAWING AND SPINNING HEMP, &c.

No. 355,870. Patented Jan. 11, 1887



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(No Model.) 3 Sheets—Sheet 2.

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MACHINERY FOR DRAWING AND SPINNING HEMP, &c.

No. 355,870. Patented Jan. 11, 1887.

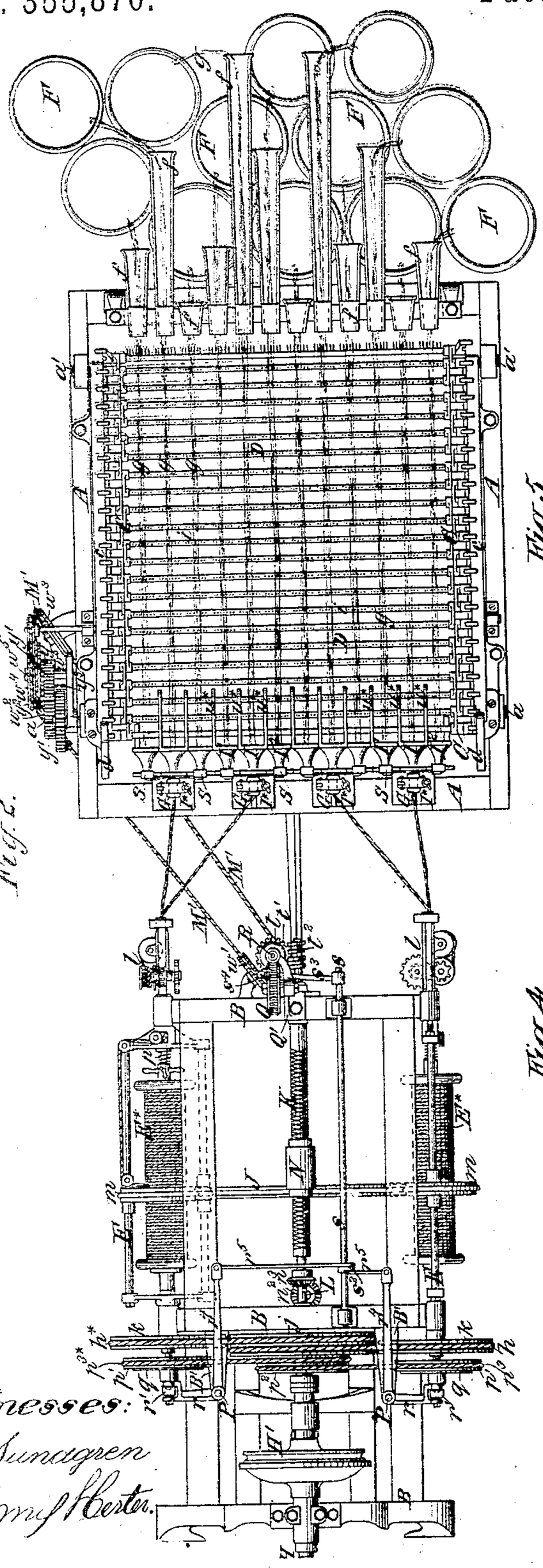

Fig. 3.

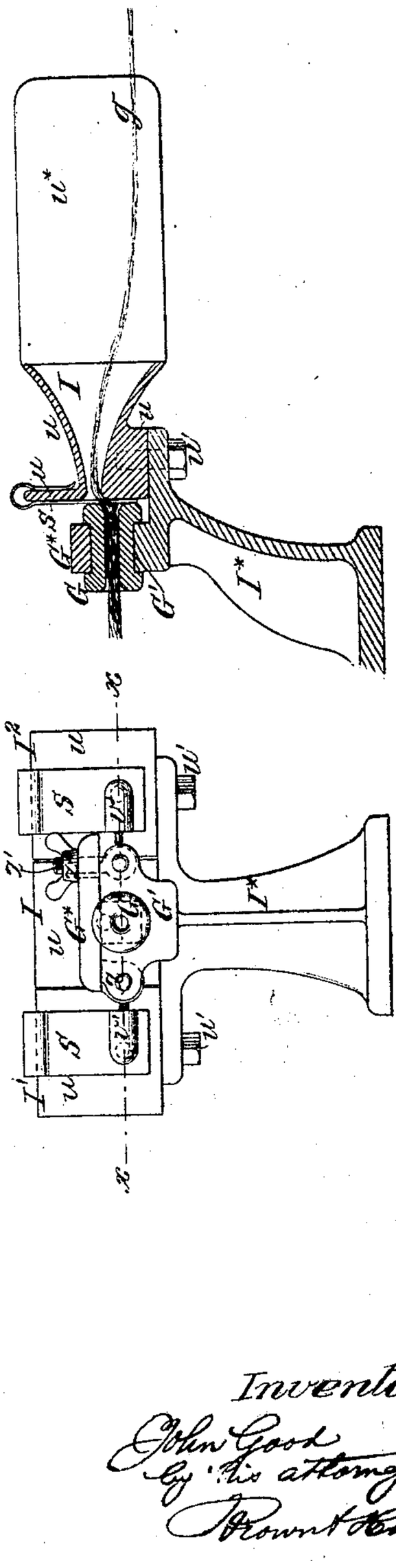

Fig. 4.

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MACHINERY FOR DRAWING AND SPINNING HEMP, &c.

No. 365,870. Patented Jan. 11, 188

Fig. 3.

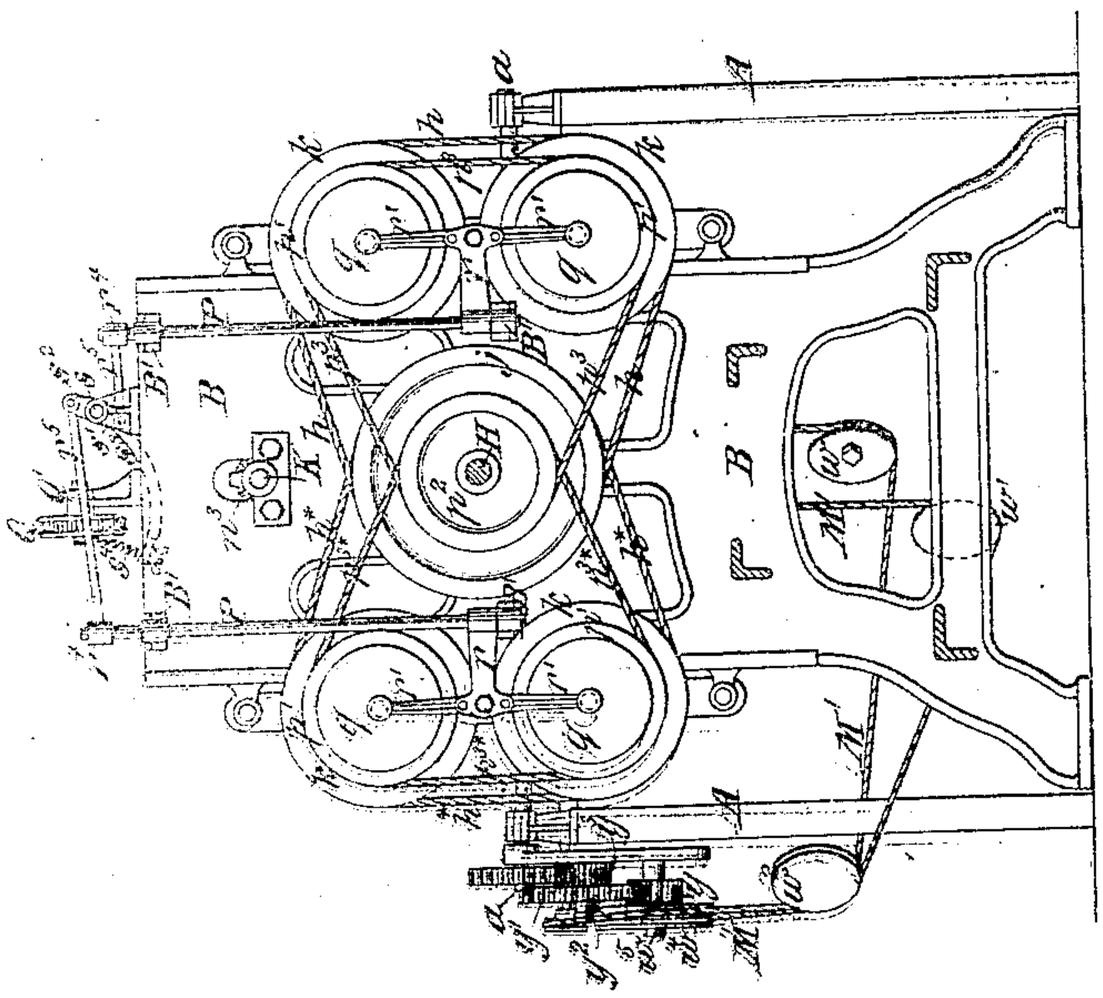
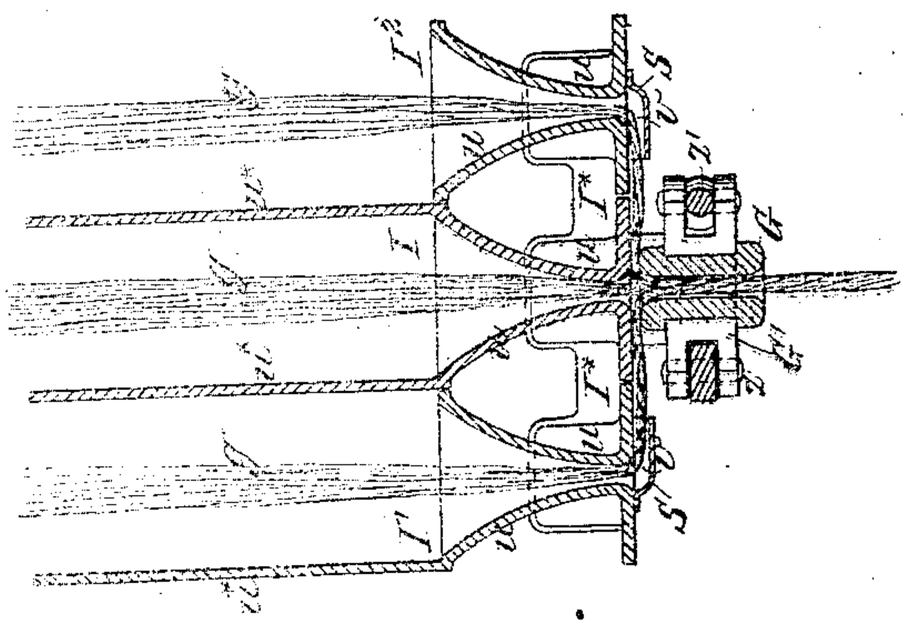


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN GOOD, OF BROOKLYN, NEW YORK.

MACHINERY FOR DRAWING AND SPINNING HEMP, &c.

SPECIFICATION forming part of Letters Patent No. 355,870, dated January 11, 1887.

Application filed May 22, 1886. Serial No. 202,934. (No model.)

To all whom it may concern:

Be it known that I, JOHN GOOD, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Machinery for Drawing and Spinning Hemp and other Fibrous Materials, of which the following is a specification, reference being had to the accompanying drawings.

The object of this invention is the carrying out of that method or process of spinning twine or rope strands composed of several slivers, which consists in subjecting the several slivers at the same time to a rotary motion, whereby each is twisted or spun separately and all are twisted or spun together, such method or process constituting the subject-matter of my United States Patent No. 330,315, dated November 10, 1885.

The invention consists, generally speaking, in the novel organization of machinery of the "jenny" type—that is to say, machinery in which the slivers presented to the fliers are drawn through a train or series of gill-pins.

The improvement particularly consists in the combination, with a catenary series or train of bars or carriers armed with gill-pins and a flier and spindle, of a plurality of conductors arranged between said bars or carriers and the fliers, substantially as herein described, to receive from said gill-pins a plurality of slivers which are to be simultaneously twisted, each separately and all together, by the rotation of the flier.

It also consists in the combination, with such series of bars, gill-pins, flier, and spindle, of a plurality of conductors and a forming-tube interposed between the bars and pins and the flier; and it further consists in various other combinations, hereinafter described and claimed.

Figure 1 in the drawings represents a longitudinal vertical section of a machine embodying the whole of my invention. Fig. 2 is a plan of the same. Fig. 3 represents an elevation of the driving end of the same, with the main driving-pulley and its clutch and the outer portion of the framing cut away to expose other parts to view. Fig. 4 represents, on a larger scale than the figures previously referred to, a front view of a group of sliver-conductors and a forming-tube which are combined with a single flier. Fig. 5 represents a central vertical section corresponding with Fig. 4. Fig. 6 represents a horizontal section in the line *x x* of Fig. 4.

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

A B designate the framing of the machine, consisting of two principal parts, of which the part A, which supports the chains C which carry the gill-pin bars D, may be termed the "chain-stand," and the part B, which contains the bearings for the fliers E, may be termed the "flier-stand."

Near opposite ends of the chain-stand there are provided thereon bearings for the shafts *a a'* of the wheels *b b'* which carry the chains C, and on opposite sides of the said stand there are provided ways *c d e*, for guiding the said chains and supporting them between the wheels *b b'*. These shafts, wheels, and ways may be similar to those common to spinning-machines of the jenny type.

The gill-pin bars D are of such length and the chain-stand of such width that the table formed by those of the bars which are at any time presented by the upper parts of the chains in a horizontal series or train will be wide enough for the drawing by and through the gill-pins *i* of as many slivers as are at any time to be spun into twine or strands in the machine.

The machine represented for example is adapted to draw twelve slivers and spin them into four strands or twines, it being provided with four fliers, E, each of which spins three slivers into the twine or strand.

On the rear of the chain-stand there are arranged behind the gill-pin bars, at equal distances apart, conductors *f*, corresponding in number with the number of slivers *g* to be spun, to receive and conduct to the gill-pin table the slivers from as many cams F, arranged behind the machine. On the front of the chain-stand there are placed as many conductors I I' I^2, which will be hereinafter more fully described, for the purpose of receiving the slivers from the gill-pin table, and in front of these conductors there are placed upon the said stand as many stationary forming-tubes G as there are fliers in the machine.

The fliers E may be arranged in their bear-

ings in the stand B in any convenient relation to the gill-pin table. They are represented in equal numbers—viz., two on each side of the stand—that they may be all driven by two bands, *h h**, from a single pulley, *j*, on the central horizontal main shaft, H, of the machine, which receives through its driving-pulley H′ the power for driving all parts of the machine. One of the said bands runs on the pulleys *k* of both of the fliers on one side and the other on the pulleys *k* of both the fliers on the other side of the machine. The fliers may be of any kind that may be suitable, and furnished with any suitable kind of capstan-head and with any suitable kind of traverse-guide and means of operating the same. For instance, the capstan-head *l* may be like that which forms part of the subject-matter of my United States Patent No. 317,116, dated May 5, 1885, and the traverse-guide carrier or traveler *m* may be of the expanding annular construction, which forms part of the subject-matter of the same patent, and the carriers or travelers *m* of all the spindles may all be operated by a single rotary and reciprocating traverse wheel or head, J, and single traverse-screw K, which form another part of the subject-matter of the said patent.

In the machine represented the traverse-operating mechanism is in all essential points, except as to the method of supporting said wheel or head J, which will be presently described, precisely the same as that shown in the said patent for operating the traverse-guide carriers of the lower group of four spindles shown in that patent, and therefore it will be necessary only to point out the several parts of this mechanism in the drawings, and make brief reference to such parts as are modified, which I will now proceed to do.

The traverse-screw K rotates in bearings provided for it in the upper part of the spindle-stand, and it derives motion from the main shaft H through a nearly upright shaft, L, having on its lower end a worm-gear, *n*, which gears with an endless screw, *n′*, on the main shaft, and having on its upper end a bevel-gear, n^2, which gears with a bevel-gear, n^3, on the shaft of the screw. The rotary and reciprocating traverse wheel or head J is fitted both to turn loosely and slide freely on the main shaft H, which, being extended through the whole length of the flier-stand to carry the pulley M, for driving the gill-pin chains, and being supported in bearings *o* in both the standards of said stand, (see Fig. 1,) serves to support the said wheel or head J without the necessity of a specially-provided stationary shaft, such as is shown in my aforesaid patent for supporting said wheel or head. The hub of the said wheel or head J is engaged by the fork on the end of the arm N′ of the carriage N, which works on the traverse-screw K, with a swiveling fork or nut section to reverse the traverse in a manner too well-known to need description here.

The spindles *p* may be fitted to the fliers and have the bobbins E* connected with them in any common or suitable manner, and may be driven by any known or suitable means. They are represented as driven through a pulley, *p′*, on each from a pulley, p^2, on the main shaft by means of two bands, p^3 p^{*3}, one of which passes round the said pulley p^2 and the pulleys *p′* of the two spindles on one side of the machine, and the other passes round the said pulley p^2 and the pulleys *p′* of the two spindles on the other side of the machine.

The method of producing the friction to control the tension of the yarn or twine as the latter is wound on the flier-bobbin E* may be of any known or suitable kind; but I prefer to produce the said friction directly between the spindle and the spindle-driving pulley, substantially as and by the means described and shown in my application for United States Patent, Serial No. 138,042, filed July 18, 1884—that is to say, by a friction-disk, *q*, fast on the spindle in contact with a friction-face on the spindle-pulley *p′*, the latter being loose on the spindle and the spindle being driven through said friction; but in a machine of this kind, having several fliers, I provide for producing the necessary increase of friction, according to the increasing diameter of the thread or strand in the bobbin, by mechanism which acts on all the spindles at once, and which I will now proceed to describe.

On the exterior of that part of the flier-stand outside of which are situated all the flier-driving and spindle-driving pulleys are brackets B′, containing the bearings for two upright shafts, P, situated at equal distances from the main shaft, as shown in Figs. 2 and 3 of the drawings. Each of these two shafts is provided with an arm, *r*, at the end of which is an upright yoke, *r′*, which stands across the ends of the two spindles *p* on its corresponding side of the machine, to bear upon the ends of those spindles. Each of said shafts P has at its upper end an arm, r^4, which combines with the arm *r* to form a lever, and the two arms r^4 are connected each by one of two rods, r^5, with one of two arms or cranks, *s′* s^2, provided on a horizontal rock-shaft, *s*, which is arranged in bearings on the top of the flier-stand. This rock-shaft *s* has also another arm, s^3, which is connected by a strong spiral spring, s^4, with a stud, s^5, on the face of a worm-wheel, Q, the short shaft of which turns in bearings in a bracket or standard, Q′, secured upon the flier-stand. The same bracket or standard contains the upper bearing for an upright shaft, R, which is geared by an endless screw, *t*, on its upper end with the worm-wheel Q, and on the lower part of which there is a worm-wheel, *t′*, which gears with an endless screw, t^2, on the end of the shaft of the traverse-screw K, and so causes the shaft R to receive from the said screw motion which it communicates to the worm-wheel Q.

The pressure on the ends of the spindles to produce the necessary friction between the spindle friction-disks *q* and the friction-faces

of the spindle-pulleys p', is produced by the tension of the spiral spring s^4 acting on the long arm s^3 of the rock-shaft s, and acting through the said arm and rock-shaft and through the arms $s' s^2$ of the latter and the rods r^5 on the upper arms, r^4, of the upright shafts P, the lower arms, r, and yokes r' of which are made to press on the ends of the spindles, and so press the friction-disks q against the pulleys p'. As the spinning and the filling up of the bobbins proceeds, the motion derived by the upright shaft R from the traverse screw produces an exceedingly slow rotary motion of the worm-gear Q in a direction to increase the tension of the spring s^4, and thereby to increase the pressure of the yokes r' on the spindles, and so increase the friction between the friction-disks q on the spindle-pulleys p' as the quantity of strand or twine on the bobbins E* increases. It may be here mentioned that the worm-wheel Q need not make more than one-quarter to one-third of a revolution.

The chains C, which carry the gill-pin bars, may be driven in any suitable manner. They are represented in Figs. 1 and 2 as driven from the pulley M, hereinbefore described, on the main shaft H and a belt, M', which runs from the said pulley under guide-pulleys $w w' w^2 w^3$, attached to the framing A of the chain-stand, and over a pulley, w^4, which turns freely on a fixed stud, w^5, secured to the said framing. To this pulley w^4 is secured a small spur-gear, y, which gears with a larger spur-gear, y', which turns freely on another fixed stud, y^2, secured in the said framing, and this spur-gear y' has firmly secured to it a smaller spur-gear, y^3, which gears with a spur-gear on the supporting and driving shaft a of the chain.

I will now proceed to describe the sliver-conductors I I' I^2, a plurality of which—namely, three in the example represented—are combined with one flier. Each of these conductors consists, principally, of a single funnel-shaped portion designated by u in Figs. 5 and 6, through which one of the flat slivers, g, from the gill-pins passes, to be gathered in and condensed into a nearly round form. Each set of three conductors, I I' I^2, belonging to one flier, is constructed as shown in Figs. 5 and 6, each of said conductors having a square flange, u^2, on its delivery end and all three being bolted by bolts u'—one for each—to one standard, I*, on which, opposite but a little below the central conductor, I, is arranged the forming-tube G, which is common to the three conductors and their respective flier. The said conductors, or as many of them as may be necessary, are provided at their wide ends or entrances with parallel cheek-plates u^*, as shown in Figs. 2, 5, and 6, to separate the entering slivers g.

Each of the two outer conductors, I' I^2, of a set has its exit-orifice covered, as shown in Figs. 4 and 6, with a bonnet, S, to cover the sliver issuing from the said conductor and direct it across the face of the conductor to the forming-tube G. This bonnet consists of a piece of elastic metal plate, which is bent, as shown in Fig. 5, to hook over the top of the flange u of its respective conductor, and attach itself thereto by its own elasticity, and the front part of which, opposite the orifice of the conductor, is channeled internally, as shown at v in Fig. 6, to receive the sliver. The channel v, being formed by swaging the plate, produces a crown on the outside of the bonnet, as shown at v' in Fig. 4.

The forming-tube G has the greater part of its length of square external form, as shown in dotted outline in Fig. 4, and is flanged at its ends, as shown in Figs. 5 and 6, to enable it to be confined in the seat or box G', provided for it on the standard I*, and forming part of the latter. This box is provided with a hinged cap, G*, which is hinged to it on one side, as shown at z in Figs. 4 and 6, and which is secured by a screw, z', and nut z^* at the other side. The forming-tube has a round perfectly smooth bore, which is enlarged and rounded off at the ends for the easy entrance of the slivers and exit of the strand or twine. By securing the forming-tube and all its respective conductors on one standard, convenience is afforded for the construction, setting up, and repair of the machine. In the operation of spinning by this machine the sliver from the central conductor, I, of each set of three passing out from the said conductor makes a somewhat abrupt bend in leaving the said conductor and another abrupt bend in passing from the said conductor to the forming-tube G, as may be understood by reference to Fig. 5, and the slivers from the outer conductors, I' I^2, of each set make an abrupt bend in passing out from the conductor under the bonnet and another abrupt bend in passing into the forming-tube G. The rotary motion of the flier produces at the same time a rotary motion of the three slivers together, and at the same time a rotary motion of each independently, and this causes each to be twisted separately and all at the same time to be twisted together. The twisting of the three together commences at the entrance of the forming-tube, and in passing through the said tube the twist is continued, while the exterior of the resulting twine or strand is finished and polished by the smooth interior of the forming-tube. The separate twist is produced in the three strands in the short spaces between the forming tube and the conductors, and this separate twist in the two slivers coming through the two outer conductors, I' I^2, of each set is rendered much more even, and the said slivers have their surfaces made much better by the bonnets S, which confine and prevent the getting astray of any loose sliver ends and cause the said ends to be twisted in.

It may be observed that the operations of twisting the slivers together and of twisting each sliver separately, and also the operation of drawing the slivers through the gill-pins,

are all performed in this machine by the flier and its spindle, the drawing being performed by the take-up action of the bobbin.

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

1. The combination, with a catenary series of bars armed with gill-pins and a flier and a spindle contained therein, of a plurality of conductors arranged between said bars and the flier, substantially as herein described, for the purpose of receiving from said pins a plurality of slivers to be simultaneously twisted each separately and all together by the rotation of the flier, as herein set forth.

2. The combination, with a catenary series of bars armed with gill-pins and a flier and spindle contained therein, of a plurality of conductors and a forming-tube interposed between said bars and the flier, substantially as and for the purpose herein set forth.

3. The combination, with a plurality of fliers and a catenary series of gill-pin bars for drawing slivers to be spun by the several fliers and a stand, as A, for supporting the entire series of gill-pin bars, of a number of forming-tubes, one for each flier, a plurality of sliver-conductors for each flier and forming-tube, and a number of independent standards, as I*, erected on said stand and each supporting the forming-tube, and the plurality of conductors for each flier, substantially as herein described.

4. The combination, with the plurality of sliver-conductors arranged side by side and the forming-tube common to all the said conductors, of bonnets applied over the faces of certain of the conductors, substantially as and for the purpose herein described.

5. The combination, with a flanged sliver-conductor, of a bonnet consisting of a bent elastic plate, S, having a channel, *v*, and hooked over the flange of the conductor, substantially as herein set forth.

6. The combination, substantially as herein described, with the several horizontal fliers and their spindles, the friction-disks fast on said spindles and the driving-pulleys loose on the same, of the upright shafts P P, provided with arms *r*, yokes *r'*, and arms r^4, the rock-shafts *s*, having arms *s' s²*, connected with said arms r^4, and also having an arm, s^3, the gear Q, the spring s^4, connecting said gear and said arm s^3, and mechanism, substantially as described, for transmitting motion to the said gear, for the purpose herein set forth.

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