(No Model.) 3 Sheets—Sheet 1.

H. B. PAYNE.

STRAIGHT KNITTING MACHINE.

No. 397,141. Patented Feb. 5, 1889.

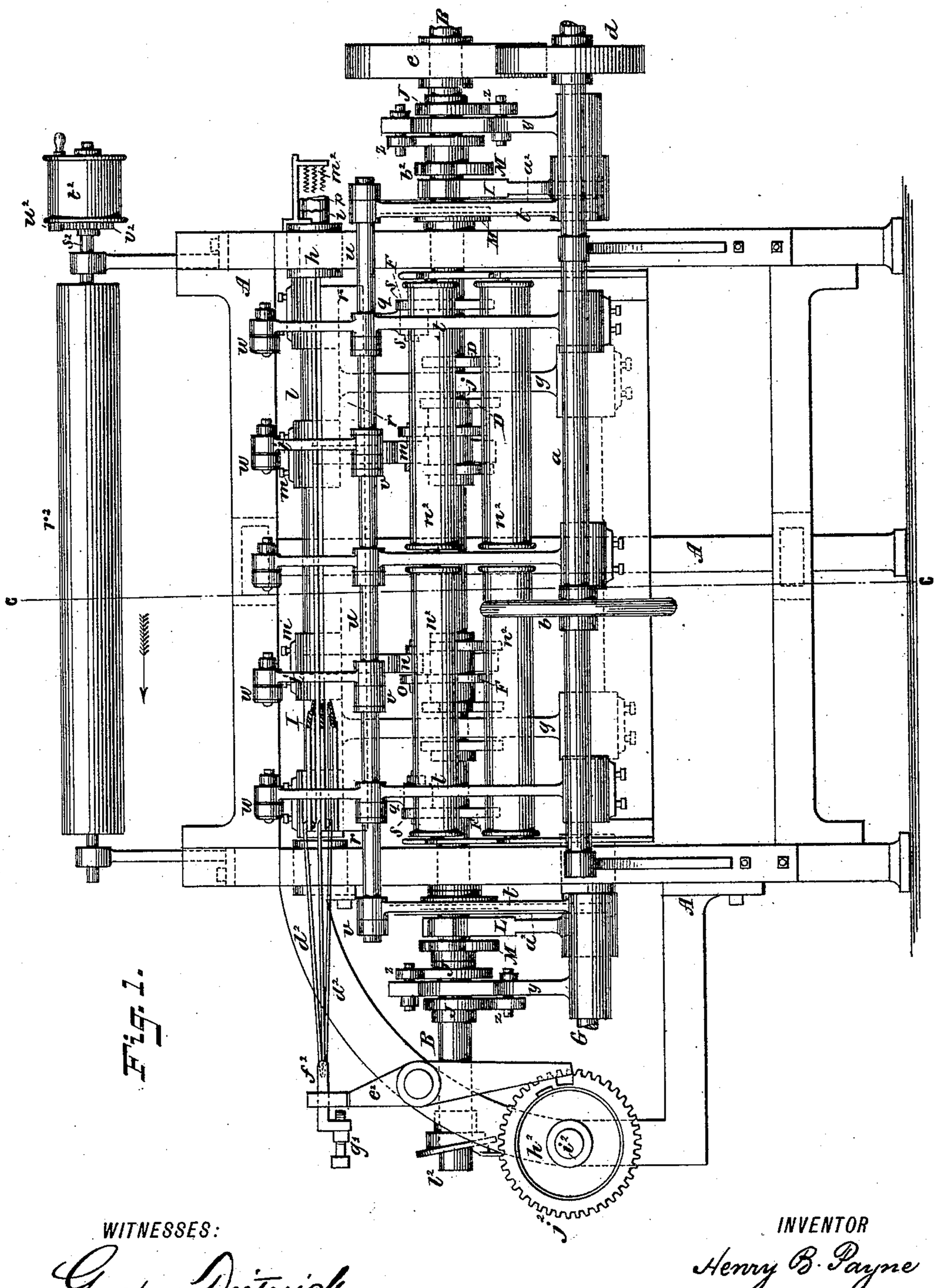

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

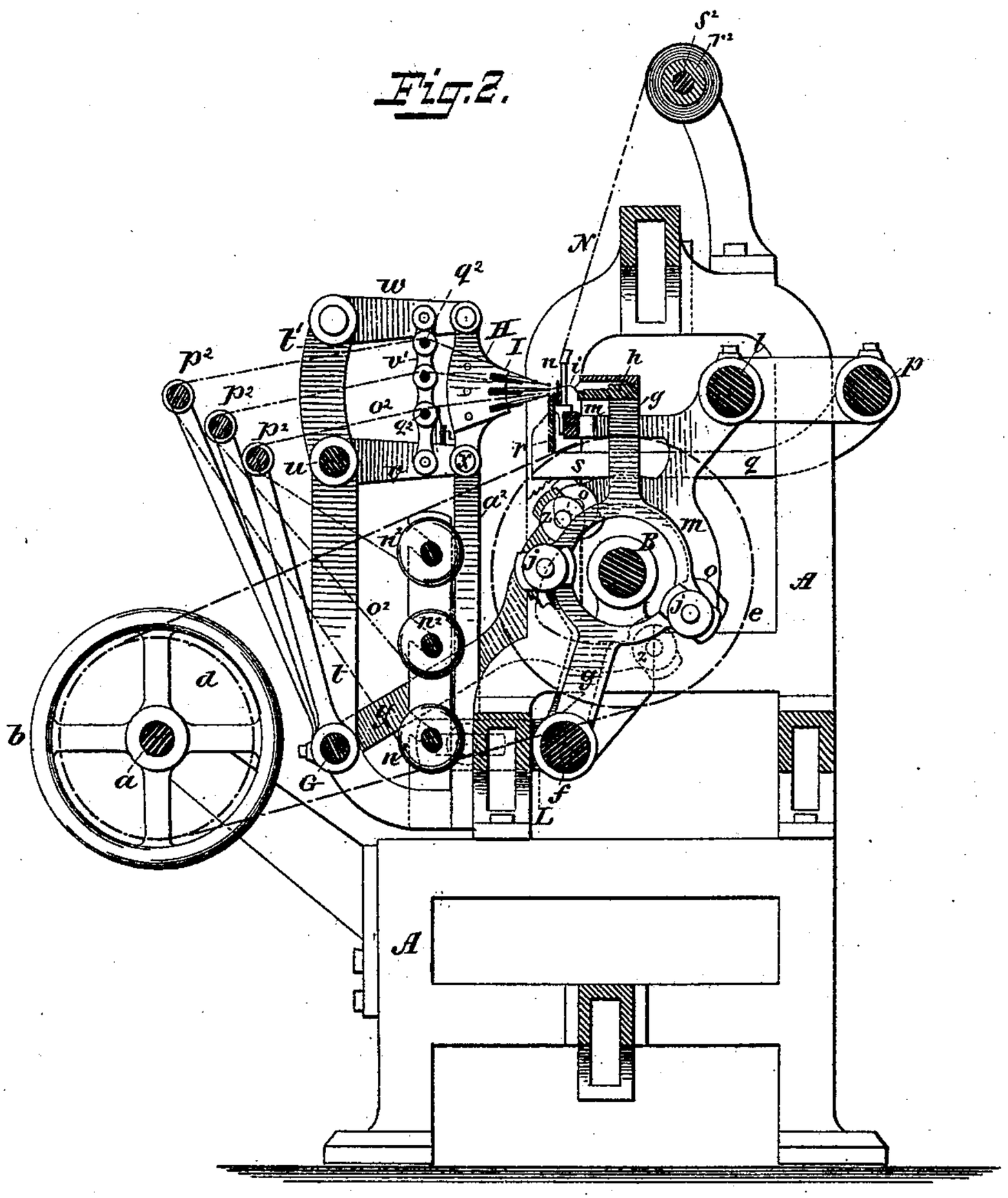

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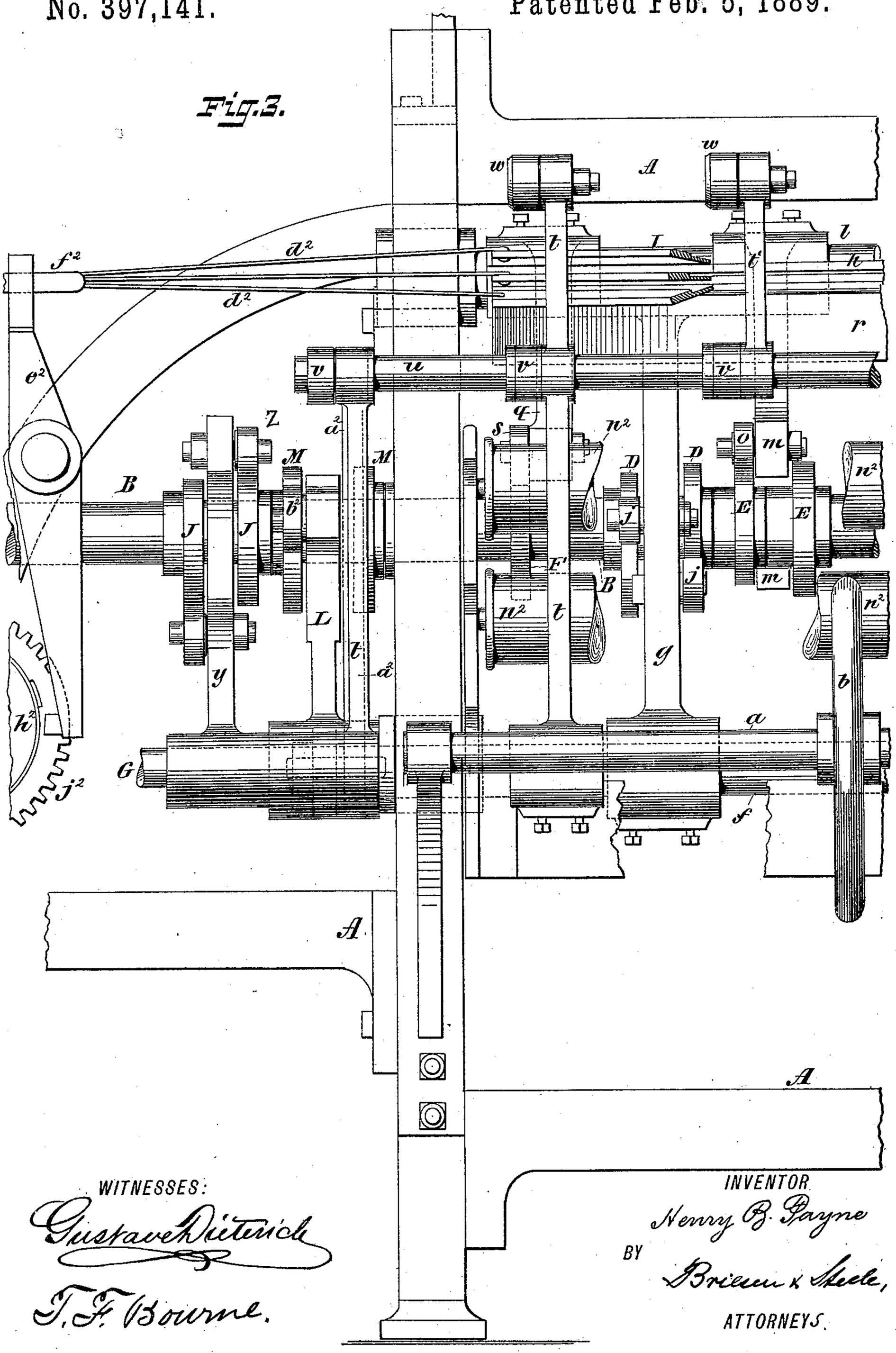
Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY BLACKFD. PAYNE, OF NOTTINGHAM, ENGLAND, ASSIGNOR OF ONE-HALF TO A. G. JENNINGS & SONS, OF BROOKLYN, NEW YORK.

STRAIGHT-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 397,141, dated February 5, 1889.

Application filed March 31, 1888. Serial No. 269,104. (No model.) Patented in England June 7, 1886, No. 7,646.

To all whom it may concern:

Be it known that I, HENRY BLACKFORD PAYNE, of Nottingham, England, have invented Improvements in Straight-Knitting Machines, (for which I have obtained Letters Patent of Great Britain, No. 7,646, dated June 7, 1886,) of which the following is a specification.

The object of my invention is to provide certain new and useful improvements in knitting-machines.

The invention consists in the details of improvement and the combinations of parts, that will be more fully hereinafter set forth.

Reference is to be had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of a knitting-machine containing my improvements. Fig. 2 is a vertical cross-section on the line *c c*, Fig. 1; and Fig. 3 is an enlarged detail front view of a portion of the machine shown in Fig. 1.

Certain parts of the machine shown in Fig. 2 are left out in Figs. 1 and 3 for the sake of clearness.

In the accompanying drawings, the letter A represents the frame of the knitting-machine, which may be of ordinary or suitable construction.

B is a cam-shaft journaled in suitable bearings in the frame A. This shaft may be driven by means of belt and pulley or other suitable gear.

a is a hand-wheel shaft journaled in suitable bearings in the frame A, which shaft carries a hand-wheel, *b*. The shaft *a* also carries a pulley, *d*, from which a belt passes to a pulley, *e*, on the cam-shaft B, whereby said hand-shaft *a* is made capable of turning the shaft B when necessary.

f is the needle-bar rock-shaft journaled in suitable bearings in the frame A. Upon this shaft *f* are secured a number of levers, *g*, which support the needle-bar *h*, upon which needle-bar the needles *i* are secured in suitable manner. The levers *g* preferably each have an opening through which the cam-shaft B passes. The levers *g* carry suitable rollers or contact-pieces, *j*, that bear upon cams D on the cam-shaft B. (See Fig. 3.) As the cam-shaft B rotates, the cams D will impart motion to the levers *g* to reciprocate the needles *i*.

l is the sinker-bar rock-shaft journaled in suitable bearings in the frame A. This shaft *l* carries a number of levers, *m*, upon one arm of which levers are secured sinkers *n* in such position that the needles *i* may pass through them. The levers *m* also carry rollers or contact-pieces *o*, that bear upon suitably-shaped cams E on shaft B, whereby reciprocating motion is imparted through the levers *m* to the sinkers *n*. In suitable bearings in the frame A is hung the presser rock-shaft *p*, upon which are mounted a series of levers, *q*, which levers *q* carry the presser *r* in such position as to engage the beards of the needles *i*. The levers *q* also carry rollers or contact-pieces *s*, that bear upon cams F on the shaft B, whereby reciprocating motion is imparted through the levers *q* to the presser *r*.

The above arrangement of parts may be altered to suit the requirements, such parts forming no part of my present invention, being shown more particularly to illustrate my improvements.

I will now show the arrangement of my improvements for operating the guide-bars.

In suitable bearings in the frame A is journaled a rock-shaft, G, from which extend a number of levers, *t*. The levers *t* are preferably arranged vertically, as shown. Near the upper or free end of these levers *t* is a rock-shaft, *u*, that passes through the levers *t*. Intermediate short levers, *t'*, also preferably extend from the shaft *u* upward parallel with the levers *t*, as shown in Figs. 1 and 3. To the shaft *u* are secured a number of links, *v*, that extend toward the needles *i*, as shown in Fig. 2. At the upper or free ends of the levers *t t'* are journaled a series of links, *w*, that extend about parallel and in the same direction with the links *v*. Through the free or inner ends of the links *v* passes a shaft, *x*. (See Fig. 2.)

H are guide-bar brackets that are journaled at one end to the shaft *x* or to the links *v*, and at their opposite or upper ends these brackets H are journaled to the links *w*. The brack-

ets H support and carry in suitable manner the guide-bars I, that are in proximity to the needles *i*. The links *v* and *w* are connected by links *v'*, that receive and support rods q^2, over which the threads o^2 pass to the guides. To the rock-shaft G, that carries the guide-bar-supporting levers *t*, are secured two (more or less) levers, *y*. These levers *y* extend to the cam-shaft B, and carry rollers or contact-pieces *z*, that bear upon cams J on said shaft. As said cam-shaft B is rotated, the shaft G, by means of the levers *y* and cams J, will be rocked, thereby acting, through the levers *t*, to move the guide-bars I from and toward the needles *i;* but it is evident that other means may be employed for moving the guides toward and from the needles in the direction of their length. The guide-bars I receive a lateral or up-and-down motion in a straight line as follows: To the shaft *x* are secured one or more pendent levers, a^2, whose lower ends are pivotally connected to levers L, that are preferably hung upon the shaft *f*. These levers L extend from the shaft *f* to the cam-shaft B and carry suitable rollers or contact-pieces, b^2, that ride upon suitable cams, M, on the cam-shaft B. As the cam-shaft B is rotated, the levers L, through the levers a^2, act upon the brackets H to raise and lower the guide-bars I. At the same time the guide-bars are moved inward by the levers *y* and *t*, which movement acts to compensate for any radial movement given the guide-bars by the lever a^2, and by this means the guide-bars are moved substantially in a straight line to lap the threads. By this means, also, the guides, while lapping the threads, are kept at one depth in the needles.

The guide-bar I may receive longitudinal or endwise motion by suitable means; but I prefer the following arrangement: To one end of each guide-bar I is secured a rod, d^2, that is connected at its opposite end to a lever, e^2, journaled on the frame A, there being one rod d^2 and lever e^2 for each guide-bar I. The rods d^2 are preferably secured to adjustable draw-bits f^2, carried by the levers e^2, which draw-bits f^2 have set-screws g^2, that bear against the levers e^2; but the guide-bars I may be secured directly to the levers e^2.

By the above means the guide-bars I may be adjusted longitudinally to bring the guides in proper position with relation to the needles *i*. The lower or free ends of the levers e^2 bear upon suitable pattern or cut wheels h^2, that are carried by a suitable shaft, i^2, journaled on the frame A. The shaft i^2 also carries a worm-wheel, j^2. This worm-wheel j^2 is engaged by a worm, l^2, on the cam-shaft B. As the shaft B rotates, the worm l^2, working in the worm-wheel j^2, rotates the shaft i^2, and thereby the pattern-wheels h^2, which, acting upon the levers e^2, actuate the guide-bars I. To the opposite ends of the guide-bars I are secured springs m^2, which springs are attached at their opposite ends to the frame A or a projection thereon. The springs m^2 act to draw the guide-bars I and to keep the levers e^2 pressed upon their respective pattern-wheels h^2 in the ordinary manner. This manner of operating the guide-bars I longitudinally is shown and fully described in an application for a patent made by me, filed January 21, 1886, Serial No. 189,238, and I refer to said application for a more detailed description.

Only part of each guide-bar I is shown in the drawings; but it will be understood that these guide-bars extend across the machine and are supported and guided in the brackets H. These bars I are broken away in the drawings for the sake of clearness.

In front of the machine the necessary beams n^2 for the threads o^2 are arranged and suitably supported. The threads o^2 pass from the beams n^2 over suitable tension-rods, p^2, suitably carried by the frame A, and thence over the rods q^2 to the guides and needles *i*.

The fabric N, when made, passes upward to the roller r^2, that is mounted on a shaft, s^2, carried by the frame A. A drum, t^2, is hung on the shaft s^2, and carries a pawl, u^2, that engages a toothed wheel, v^2. By means of a cord wound on the drum t^2 and a weight secured to the cord (not shown) the roller is rotated; but any suitable means may be employed for turning the roller r^2 to wind the fabric.

Having shown the arrangement of the different parts and how they are given their respective motions, I will now show how the machine operates to make fabric. The threads being in position and the parts ready for operation, the machine is started. The needles *i* are first moved forward sufficiently far to allow the guides to lap the threads around the needles, which is done by the guides moving first, say, longitudinally through the action of the levers e^2 and pattern-wheels h^2. The guides then move, say, downward through the action of the levers a^2 and L, the guides again moving longitudinally and then upward by the action of the levers a^2 and L to the first position. The threads are now lapped on the needles. The needles *i* then move forward toward the guides to their full extent to pass the laps on the needles under the beards. The needles then move backward, and just as the beards of the needles enter the sinkers *n* the presser *r* moves and presses the beards of the needles into their respective eyes. The needles then continue to move backward sufficiently in the sinkers to enable the last loop formed on the needle to be knocked over, the sinkers then moving down and up to secure the last loop made under the nibs of the sinkers. As the needles *i* move backward, as above stated, the guides are moved outward or away from the needles and then inward through the action of the levers *y* and *t*, the effect of which movement of the guides is to bring the loops on the needles *i* well forward under the beards of the needles, in order to prevent the

thread from being trapped and broken by the action of the presser *r* on the beards of the needles.

By the above arrangement of parts the fabric is enabled to proceed directly upward from the sinkers and needles, thus enabling the workman to inspect and detect defects in the fabric immediately on production, which constitutes a most beneficial feature in knitting.

I would have it understood that I do not confine myself to working and arranging the needles horizontally and to the relative position thereto of the other parts working in conjunction with the needles, as hereinbefore described, as the needles may be set in any desired other position and the other parts relative thereto for various purposes.

Having now described my invention, what I claim is—

1. The guide-bar I and brackets H for said bar, combined with the links *v w*, supporting said brackets, lever a^2, for moving said brackets, the lever L, for actuating said lever a^2, and with the lever *t* and the cam-shaft, substantially as described.

2. The guide-bar I and its brackets H, combined with the links *v w*, levers *t*, supporting said links *v w*, shaft G, and the lever *y*, for actuating the levers *t*, and with the lever a^2 and the cam-shaft, substantially as described.

3. The guide-bar brackets H, their supporting-links *v w*, links *v'*, and rods q^2 for the threads, combined with the levers *t*, that support the links *v w*, shaft G, and the lever *y*, for actuating the levers *t*, and with the lever a^2 and the cam-shaft, substantially as described.

4. The combination of the guide-bar brackets H, links *v w*, supporting said brackets, levers *t*, carrying said links *v w*, shaft G, lever *y*, for actuating the levers *t*, levers a^2 and L, for moving the brackets H, and the cam-shaft, all arranged for operation substantially as herein shown and described.

The above specification signed by me this 8th day of December, 1887.

H. BLACKFD. PAYNE.

Witnesses:
HARRY M. TURK,
GUSTAV SCHNEPPÉ.