

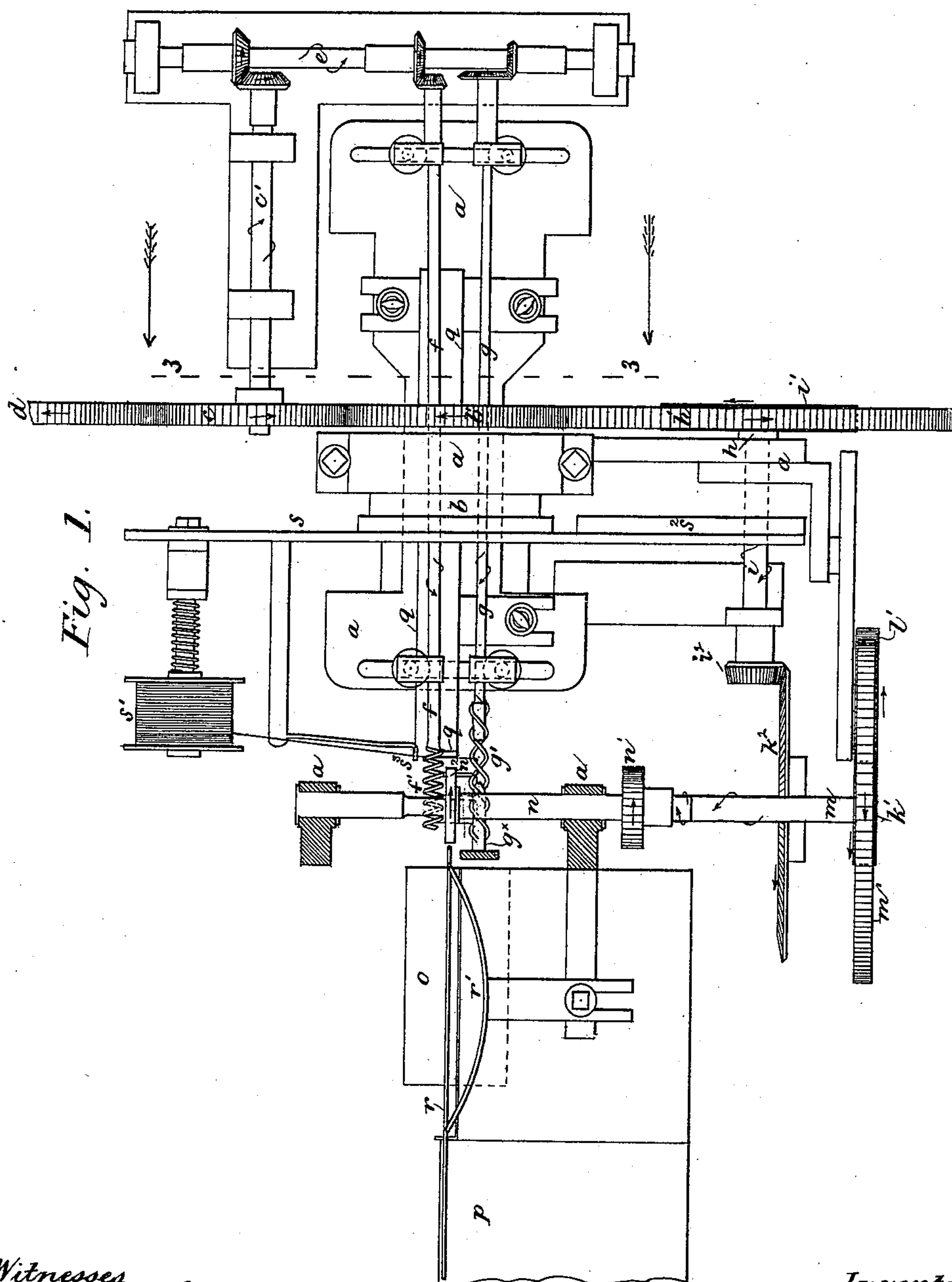
(No Model.)

6 Sheets—Sheet 1.

C. G. HILL.  
RUCHING MACHINE.

No. 464,648.

Patented Dec. 8, 1891.



Witnesses  
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(No Model.)

6 Sheets—Sheet 2.

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Fig. 1<sup>a</sup>.

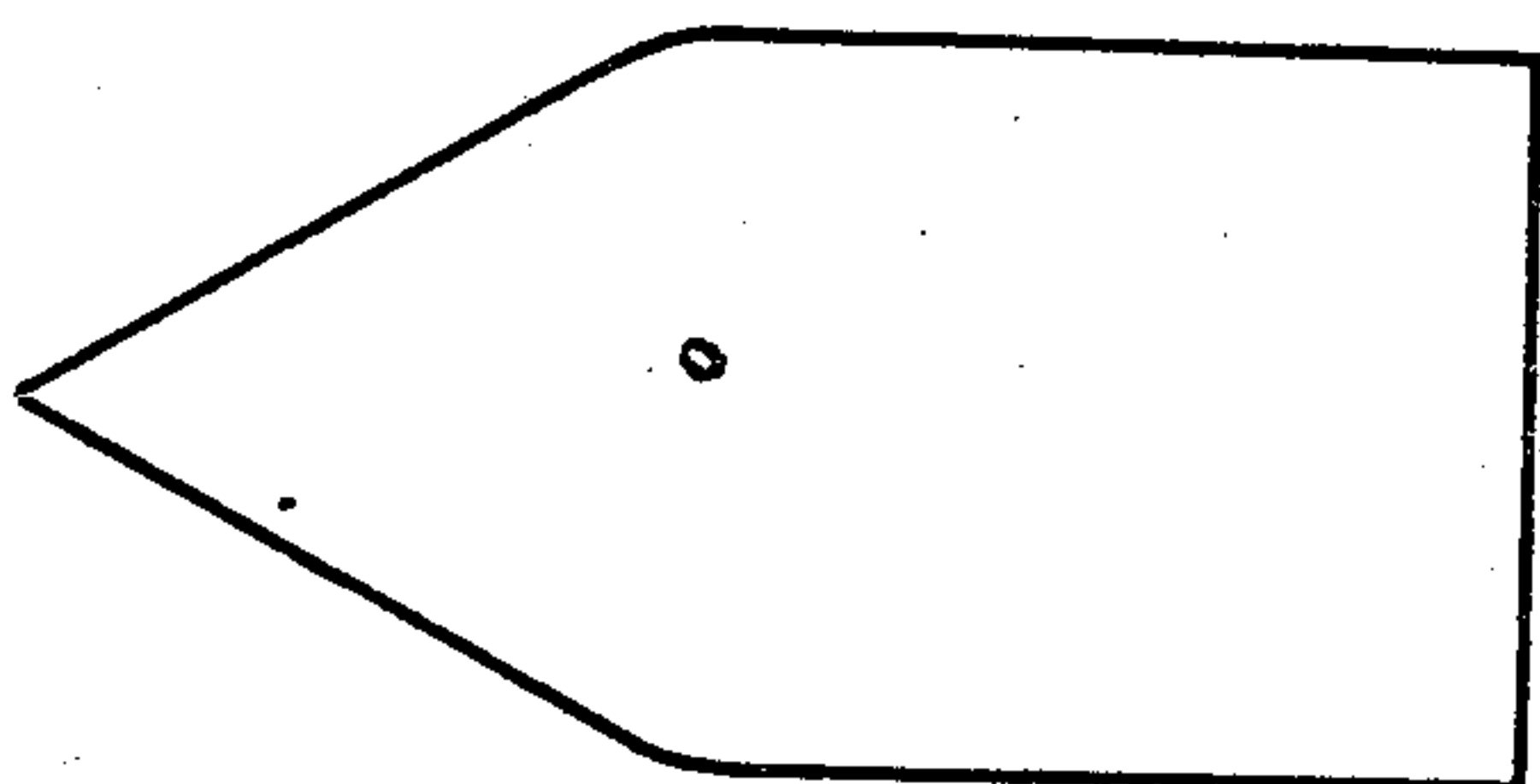


Fig. 1<sup>b</sup>.

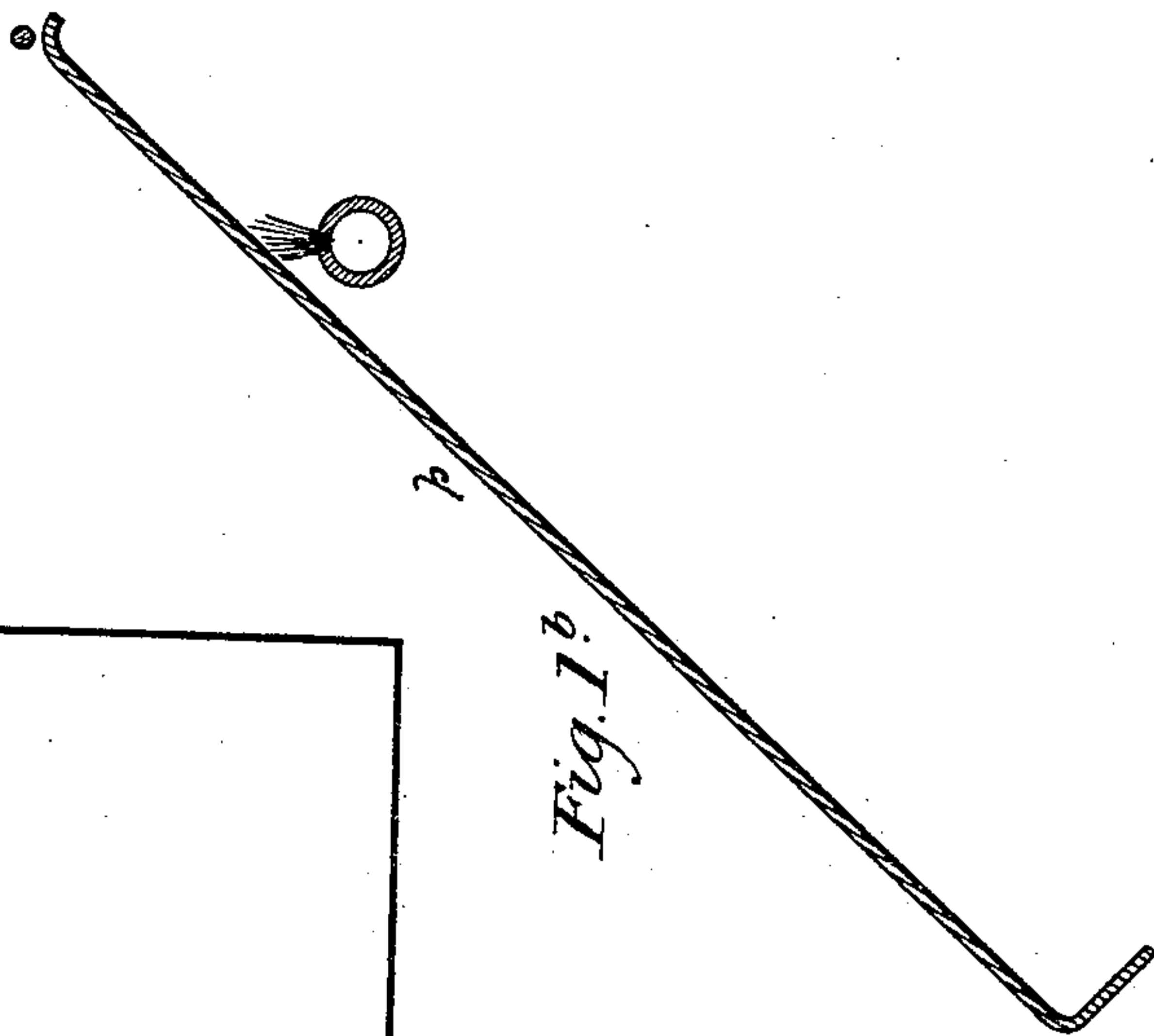


Fig. 4.

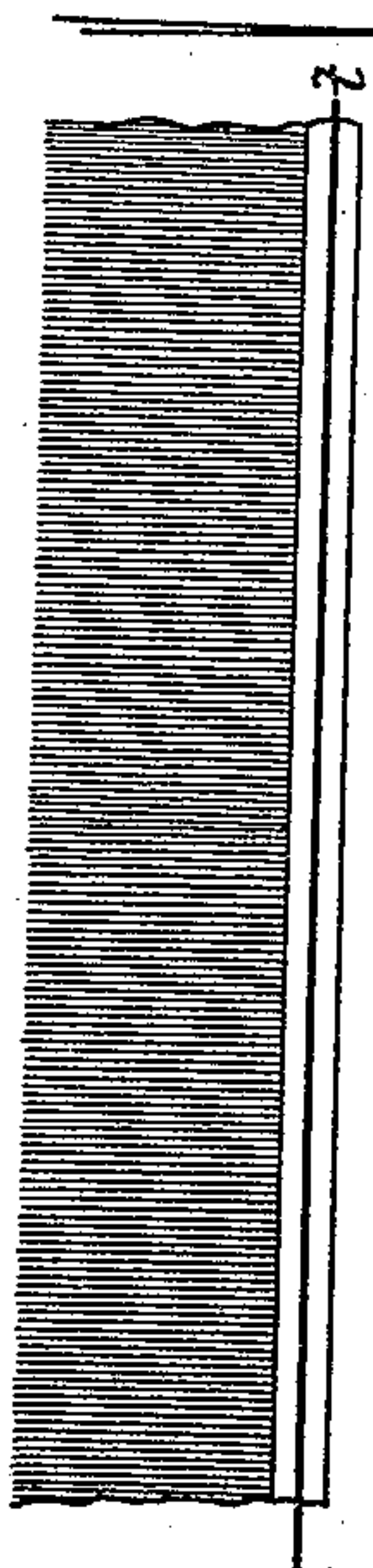
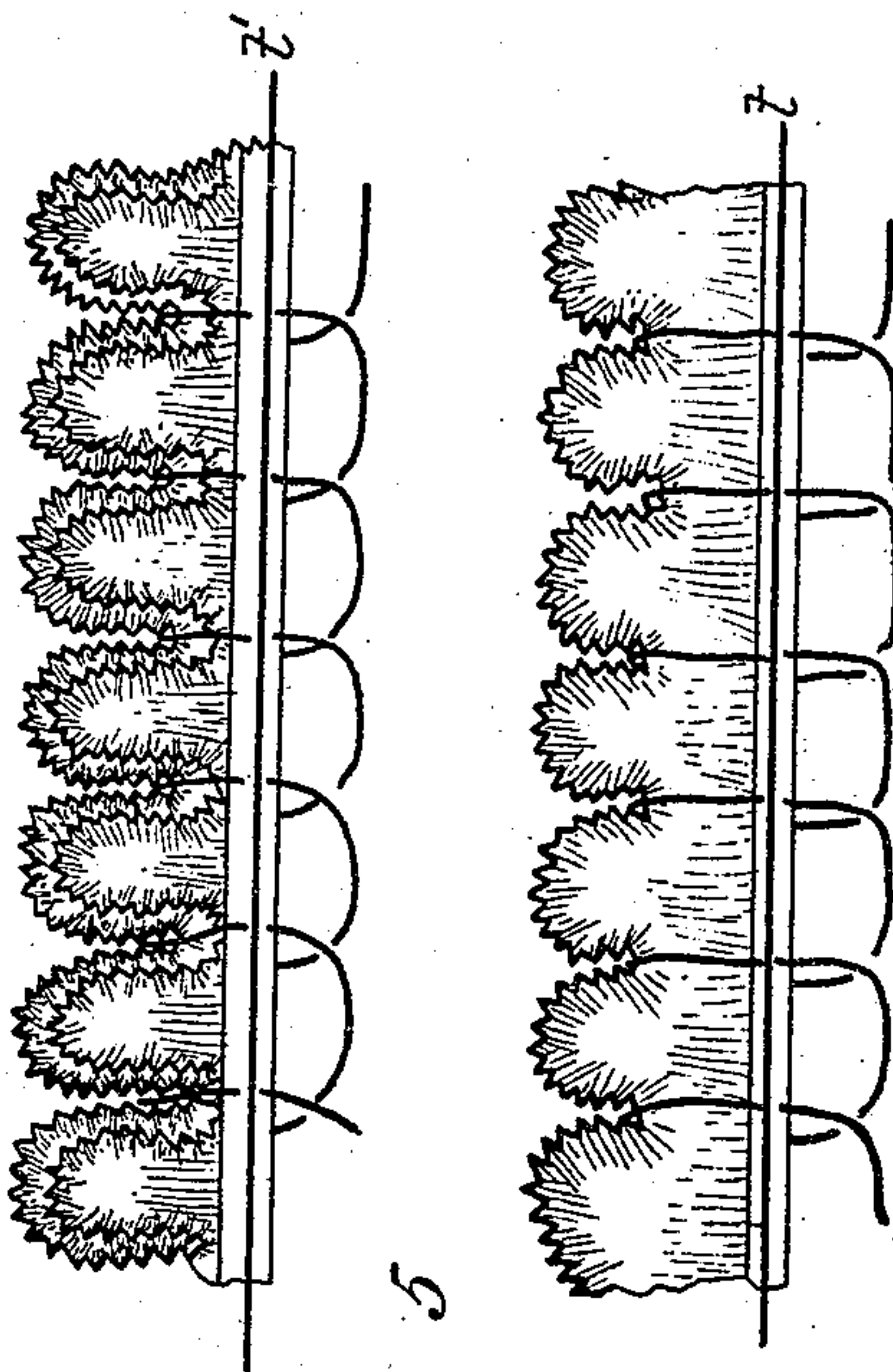


Fig. 5



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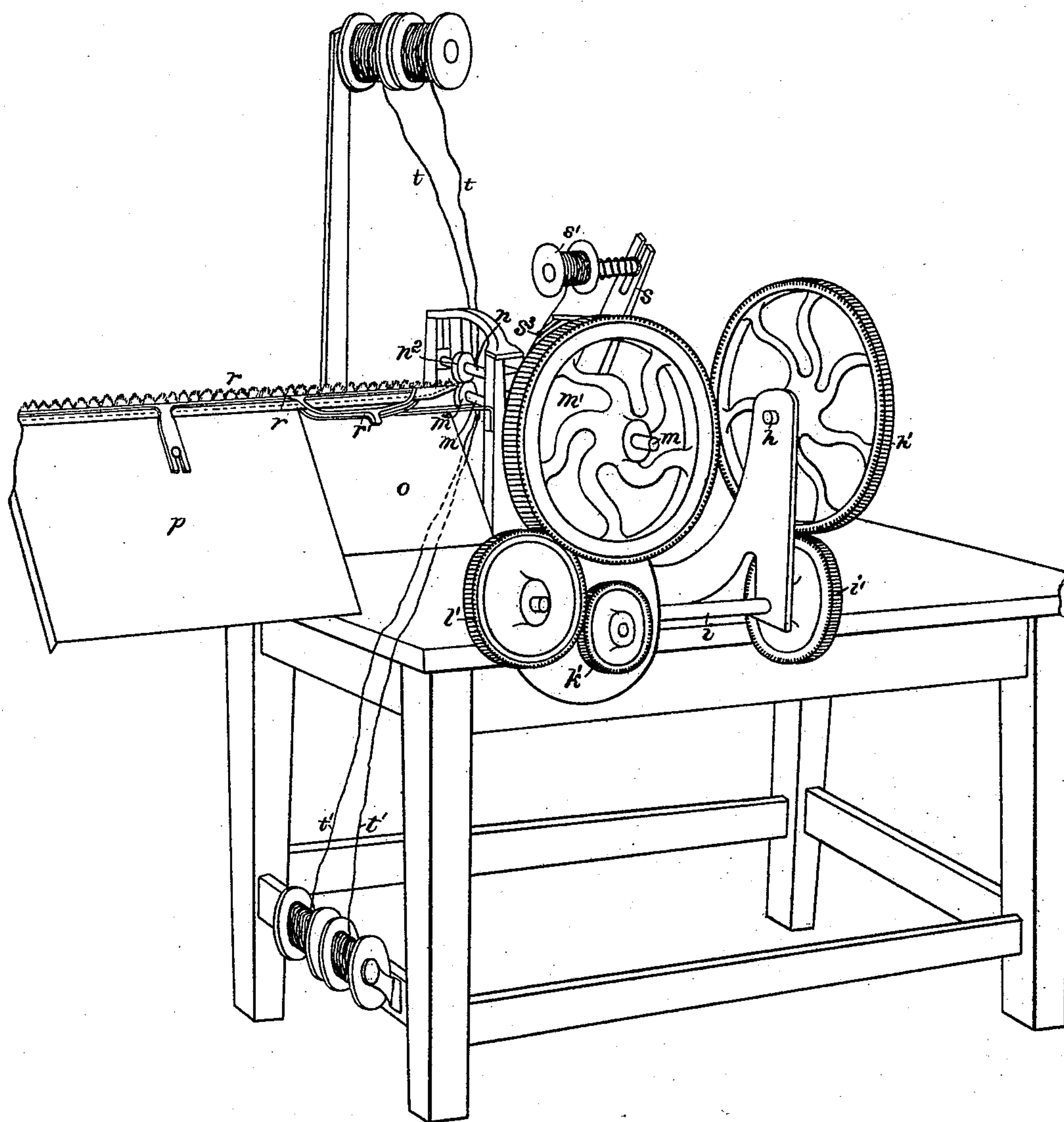
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Fig. 1<sup>x</sup>



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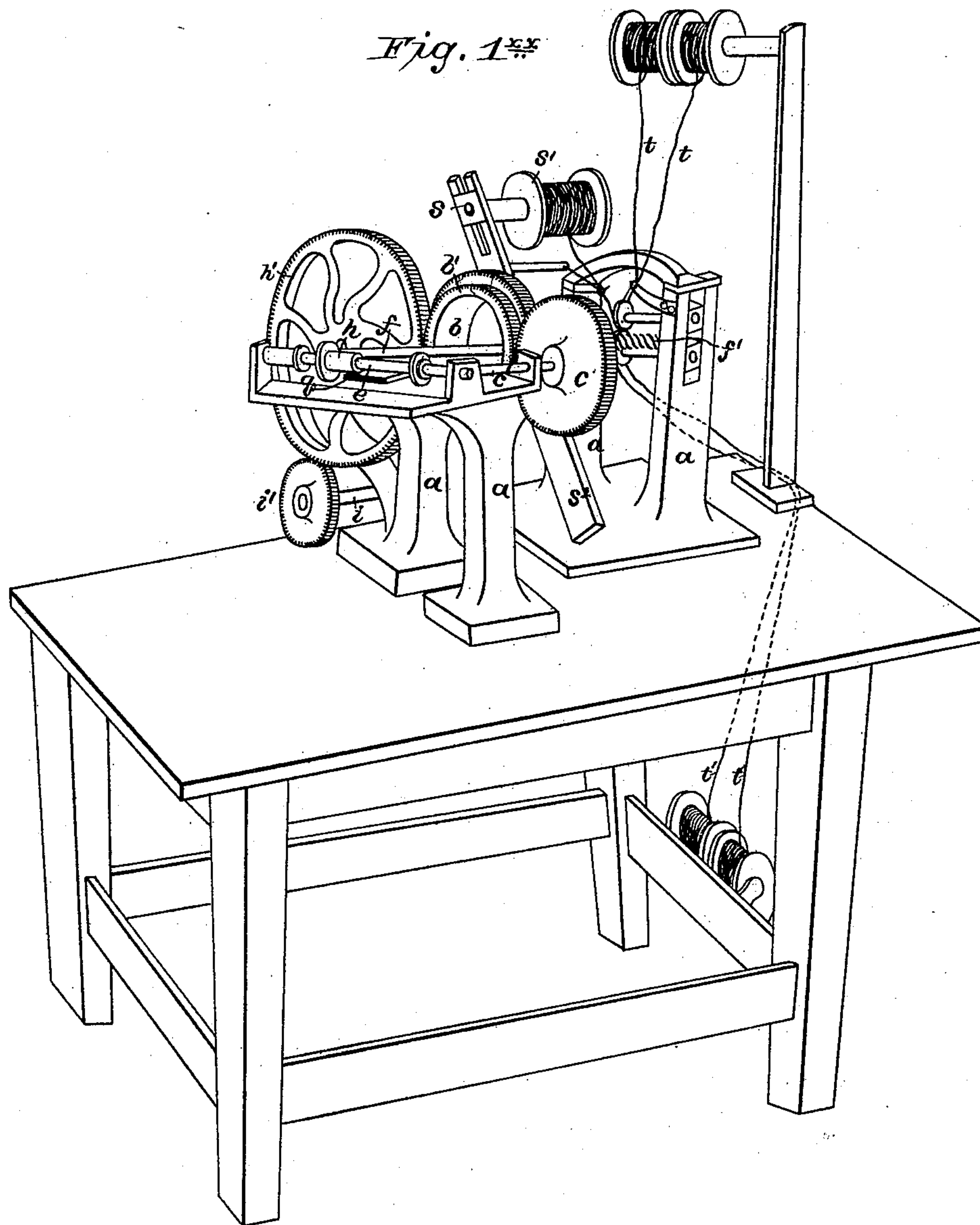
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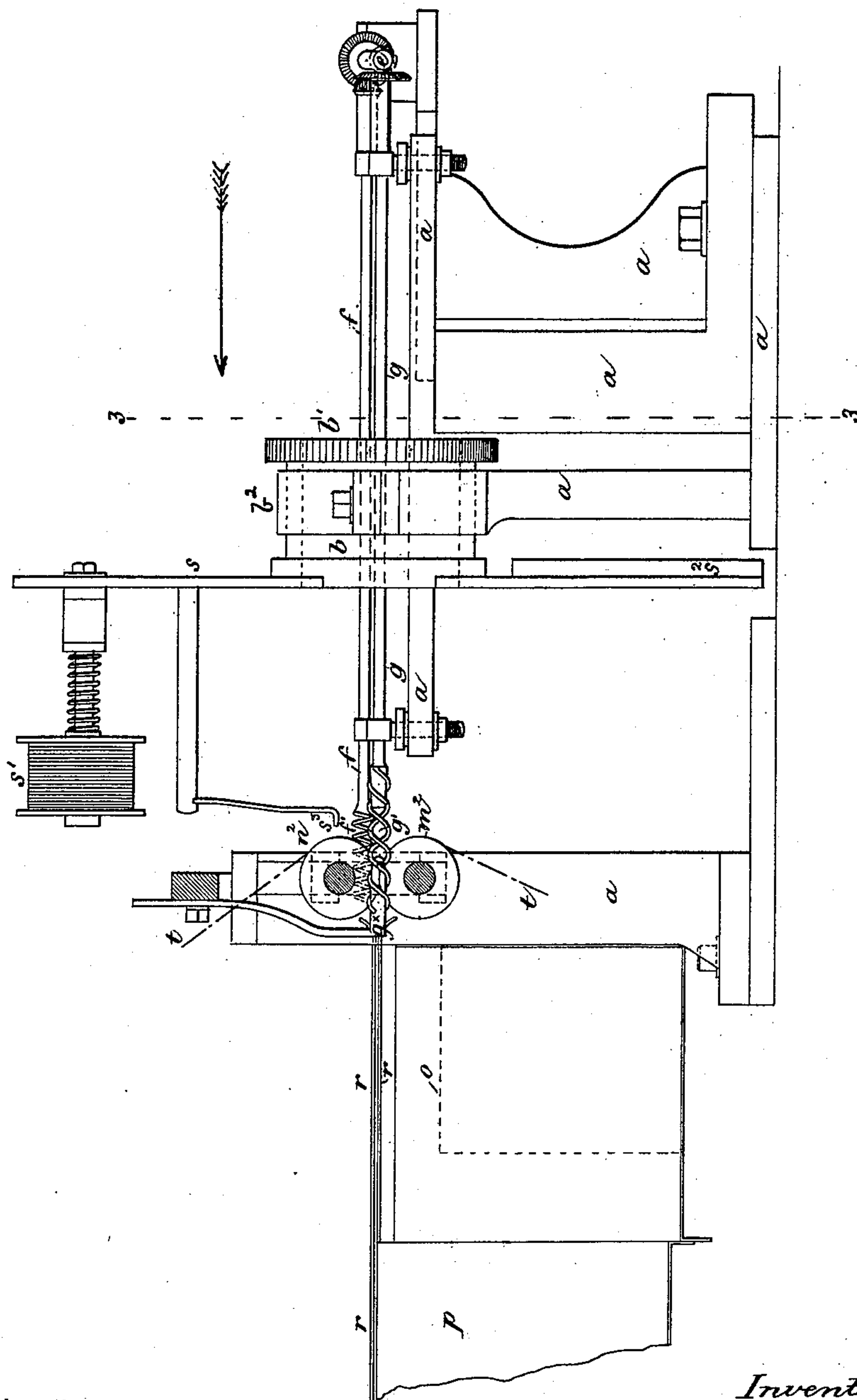
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*Fig. 2.*



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6 Sheets—Sheet 6.

C. G. HILL.  
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No. 464,648.

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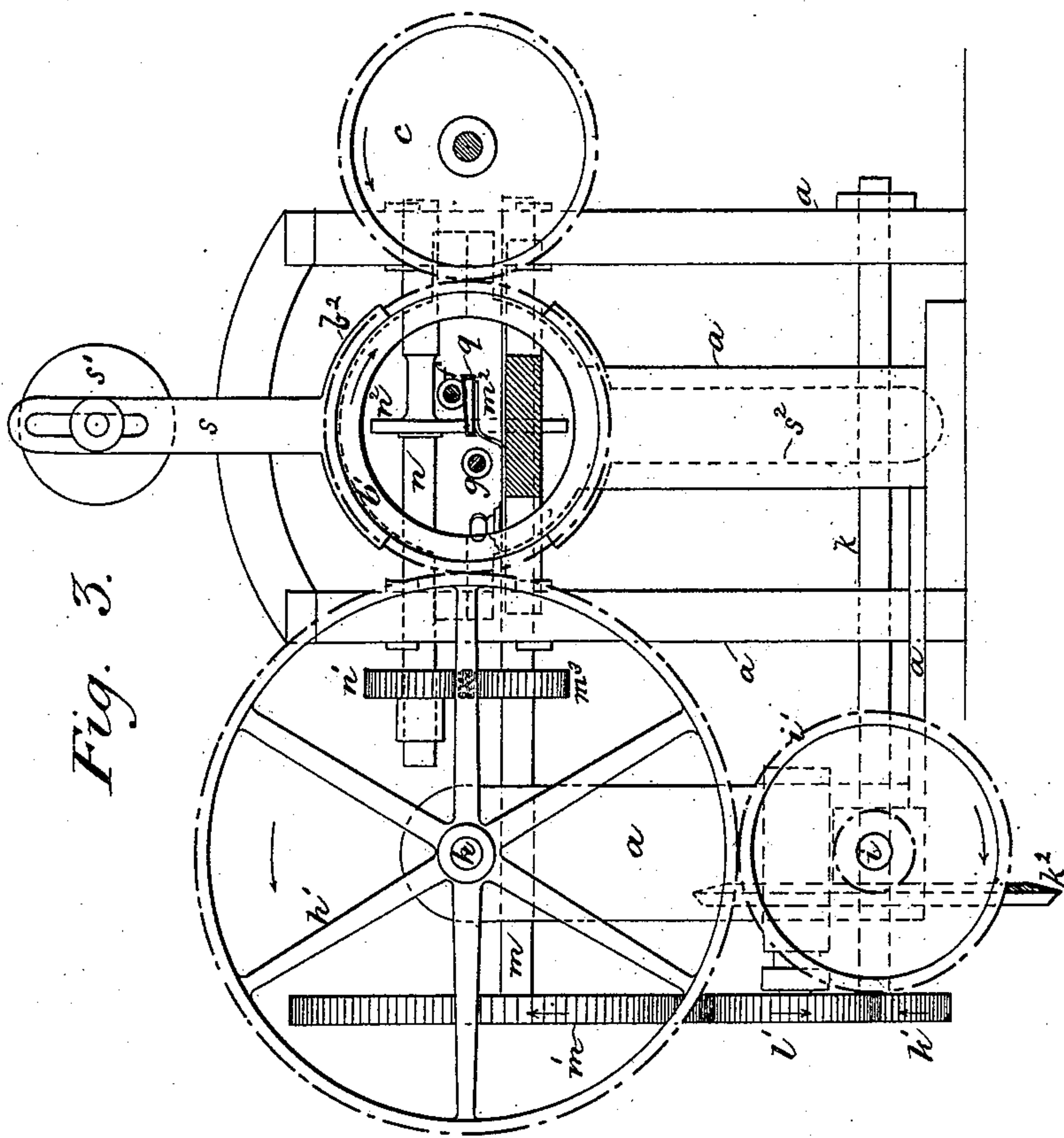


Fig. 3.

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# UNITED STATES PATENT OFFICE.

CHARLES GREY HILL, OF ARNOT HILL, ENGLAND.

## RUCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 464,648, dated December 8, 1891.

Application filed September 20, 1886. Serial No. 214,042. (No model.) Patented in England December 1, 1885, No. 14,776, and in France April 7, 1886, No. 175,326.

*To all whom it may concern:*

Be it known that I, CHARLES GREY HILL, a subject of the Queen of Great Britain, residing at Arnot Hill, in the county of Nottingham, England, have invented certain new and useful Improvements in Machines for Making Ruching or Frilling, (for which I have received Letters Patent in Great Britain, No. 14,776, dated December 1, 1885, and in France No. 175,326, dated April 7, 1886,) of which the following is a specification.

My invention relates to machines of the class in which frilling or ruching fed there-through is wrapped with thread, cord, or like material, while longitudinal threads are simultaneously caused to adhere to its surface by means of pressure. Its object is to produce an approved form of ruching by means of simple and effective mechanism, which end I attain by certain novel constructions, combinations, and organizations of instrumentalities hereinafter specified.

The accompanying drawings show so much of my improved machine as is necessary to illustrate the subject-matter claimed. Unless otherwise indicated, the parts are of usual approved construction. The entrance or feed end of the machine I term the "back," the opposite or delivery end the "front." That side on the right of a person facing the front of the machine I term the "right," the opposite the "left." Darts indicate the direction of movement of some of the parts.

Figure 1 is a plan; Fig. 1<sup>x</sup>, a perspective view from the right-hand front corner of the machine, looking from the delivery toward the feed end. Fig. 1<sup>xx</sup> is a corresponding view taken from the opposite corner, looking from the entrance to the delivery end, some of the parts at the latter end being omitted in this figure; Fig. 1<sup>a</sup>, Sheet 6, a transverse section of the steam-moistener; Fig. 1<sup>b</sup>, a corresponding section through the gas-heater plate; Fig. 2, an elevation of the right side of the machine, partly in section; and Fig. 3, a vertical cross-section on the line 3 3, looking forward or toward the delivery end of the machine. Fig. 4, Sheet 6, shows the form of the frilling or ruching as it passes into the machine. Figs. 5 show, respectively, front and back views of the completed frilling.

The mechanism is shown as mounted in a main frame *a*. A short tube *b* of comparatively large diameter turns in bearings *b*<sup>2</sup> in the frame and carries a toothed wheel *b*<sup>1</sup>, gearing with another wheel *c* on an axis *c*<sup>1</sup>, in turn gearing with a wheel *d*, receiving movement in any convenient manner and driving all parts of the machine. A bevel-pinion on the front end of the longitudinal axis *c*<sup>1</sup> drives a corresponding pinion on a cross-shaft *e* on the front or feed end of the machine, which in turn, by corresponding pinions, drives two parallel longitudinal axes *f g*, passing through the tube *b* to the front or delivery end of the machine. These axes carry, respectively, corkscrew-like spirals *f' g'*, the former a comparatively closely-coiled single spiral, the latter a double spiral of twice the length of pitch of the former one; but the speed of rotation of the double spiral *g'* is only half that of the single spiral *f'*. The organization is such that both these spirals revolve in opposite directions or toward each other on their upper surfaces, as shown by the arrows in Fig. 1. A support *g*<sup>x</sup> enters the interior of the front portion of the double spiral *g'*.

The spirals, their axes, and driving-gear are made adjustable relatively to each other and to the pressure-roll by well-known means shown in the drawings and which require no particular description.

The gear-wheel *b*<sup>1</sup> drives a corresponding one *h*<sup>1</sup> on a stud-axis *h*. This wheel *h*<sup>1</sup> gears with a corresponding pinion *i*<sup>1</sup> immediately below it on a longitudinal axis *i*, a bevel-gear *i*<sup>2</sup>, on the front end of which drives a corresponding gear *k*<sup>2</sup> on a cross-shaft *k*. A spur-wheel *k*<sup>1</sup> on this shaft drives a corresponding wheel *l*<sup>1</sup>, which in turn drives a wheel *m*<sup>1</sup> on a cross-shaft *m* above it, on which the lower pressing-roll *m*<sup>2</sup> is mounted. The upper pressing-roll *n*<sup>2</sup> is mounted on a parallel axis *n*, carrying a pinion *n*<sup>1</sup>, gearing with a corresponding pinion *m*<sup>3</sup> on the axis *m*. Both these pressing-rolls lie in the same vertical plane between the spirals and close together.

A vessel *o* provided with a roof-shaped longitudinally-slitted top (see Fig. 1<sup>a</sup>) is arranged in front of but slightly below the pressing-rolls. Steam issuing through this slit acts on the fabric as it passes from the



rolls, after which it passes over a guide-plate  $p$ , heated by means of gas. Guide-wires  $r$ , resting on adjustable supports  $r'$ , overlie the vessel  $o$  and plate  $p$ .

5 A guide  $q$  (shown in the form of a flattened tube, Figs. 1 and 3) extends through the tube  $b$  to a point near the pressing-rolls. As shown in Fig. 3, this guide lies in the horizontal plane of the junction of the pressing-rolls with  
10 one edge in line therewith. The single spiral  $f'$ , it will be observed, lies above this tube, while the double one  $g'$  lies at about the same level and on the opposite side of this guide. A transverse arm or frame  $s$ , fixed upon and  
15 revolving with the tube  $b$ , carries a counter-balance  $s^2$  at one end and a bobbin  $s'$  at the other. The cotton or thread from this bobbin passes to the work through a guide-eye  $s^3$ , carried by an arm on the frame  $s$ . Spools  
20 mounted on the frame supply threads  $t$  to be laid longitudinally on the frilling, as herein-after explained.

Frillings and ruchings are largely made by setting a plaited or goffered fabric into a  
25 straight band. Fig. 4 shows such a fabric as it is passed into the machine. It consists of two strips of gauze, muslin, or other suitable fabric, separately plaited and set into a band, one of these strips—in this instance the un-  
30 der one—being shown as somewhat narrower than the other. Figs. 5 show front and back views of the ruching as it leaves the machine, with the frill displaced or drawn in at regu-  
35 lar intervals by a cotton or thread wound around it. The cotton, it will be seen, has drawn the top or loose edge of the frill down-ward or inward toward the band, at the same  
40 time carrying the frill forward and opening out the plaits. The lower part of Figs. 5 shows the upper or longer side of the frill, while the upper part shows the opposite or  
under side, representing both the wider and the narrower plaiting.

The work, then, which this machine has to  
45 do is to convert the frilling shown in Fig. 4 into the form shown in Figs. 5, which is done in the following manner: The straight frill, Fig. 4, is passed through the guide-tube  $q$ , with its face or narrower plait downward,  
50 and is inserted between the pressing-rolls  $m^2$   $n^2$ , which nip the flat band, and thus draw the frilling continuously through the tube  $q$ , which terminates just in front of the rollers and between the spirals  $f'$   $g'$ , as above de-  
55 scribed. As the frilling passes from the tube to the pressing-rollers the cotton or thread from the spool  $s'$ , passing through the guide-eye  $s^3$ , is wound around both the frilling and the spirals  $f'$   $g'$  by the rotation of the tube  $b$ .  
60 The thread is thus distended by the spirals, and, as it is laid around the frilling, encroaches upon its edge and causes it to assume the form shown in Figs. 5. The direction of ro-  
65 tation of the spiral  $f'$ , it will be seen, is such as to cause the cotton gradually to feed forward over its point toward the pressing-rolls. The double spiral  $g'$ , although twice the

length of pitch, revolves at only half the speed of the single spiral  $f'$ , and conse-  
quently retards the forward movement of 70 the winding cotton on the band-edge of the fabric, the consequence of which organiza-  
tion and operation is that the winding cot-  
tons or threads cross the ruching directly  
75 from side to side, instead of diagonally, each turn or revolution of the double spiral car-  
rying forward upon it a complete convolu-  
tion of the winding cotton or thread. In or-  
der to fix this winding thread to the band of  
the frilling, the pressing-rollers  $m^2$   $n^2$  are 80  
heated by suitable well-known means, such as a gas-flame playing on their axes. The wind-  
ing cotton, being slightly moist, sticks firmly  
to the starched or dressed band of the frill-  
ing when pressed upon it by the hot rollers. 85  
The attachment of this winding thread to the  
band is rendered more secure by means of a  
series of longitudinal threads or cottons  $t$   $t'$ ,  
passing around the pressing-rollers on both  
90 sides of the band and fixed thereon in the way described. These threads cross the wind-  
ing thread, as shown in Figs. 5. After passing  
between the pressing-rolls the band of the  
frilling is drawn by hand between the two  
95 parallel guide-wires  $r$   $r'$ , standing one over the other, and carried by spring-arms  $r'$ , which  
tend to press them lightly together, so that  
the band of the fabric is gently held and  
guided. During its passage between these  
100 guides the band is moistened by steam issu-  
ing from the longitudinal slit in the top of  
the vessel  $o$ , which steam or vapor is admit-  
ted thereto in small quantities from any suit-  
able generator, thus very slightly moistening  
105 the fabric. The moistened fabric is then drawn over the heater-plate  $p$ , which dries it,  
and the work is then set in well-known ways,  
so that the frill will retain its form, even with-  
out the aid of the threads, any or all of which  
110 may be removed from the finished fabric, if desired, without detriment. The above-de-  
scribed organization is such, it will be ob-  
served, that the frilling passes through the  
revolving tube  $b$  on which the winding-thread  
115 carrier is mounted from a point near the en-  
trance to a point near the delivery end of the  
machine. The guide-tube through which the  
frilling passes terminates a short distance in  
front of the pressure-rolls. The single spiral  
120  $f'$  overlies the frilling side of the guide, ex-  
tending across the space above mentioned be-  
yond the axis of the narrow crimping or press-  
ing rollers, which act on the band close to the  
frilling, or, in other words, in line with the  
125 opposite edge of the guide. The double spi-  
ral  $g'$ , it will be seen, extends across the same  
space, somewhat below and on one side of this  
latter side of the guide. It also extends be-  
yond the axis of the pressing-rollers, its de-  
130 livery end being supported by a stationary  
stud  $g^x$ , over the point of which the winding  
thread is drawn by the action of the spirals  
and pressing-rollers. The winding thread, it  
will also be observed, is wound around the



spirals and filling just in advance of the delivery end of the tubular guide during the passage of the frilling across the space between the end of the guide and the pressing-rollers, so as to act directly upon the edge of the frilling to crimp or indent it. As the double spiral *g'* lies outside of a vertical plane passing through the adjacent edge of the guide-tube, the band-edge is prevented from being indented, while the single spiral, lying inside of the corresponding plane of the opposite side of the guide-tube, causes the loose edge of the frilling to be indented or crimped, as above explained.

Having thus fully described the construction, organization, and operation of my improved frilling and ruching machine, what I claim therein as new, and as of my own invention, is—

1. The combination, substantially as hereinafore set forth, of a frilling-guide, pressing-rollers which draw the frilling therefrom, spirals of different pitch on opposite sides of the guide, and a winding-thread carrier or guide rotating around the frilling-guide and spirals to lay a winding thread around the frilling between the guide and pressing-rollers, as described.

2. The combination, substantially as hereinafore set forth, of a frilling-guide, pressing-rollers which draw the frilling therefrom, spirals rotating at different speeds on opposite sides of the guide, and a winding-thread carrier or guide rotating around the spirals to wind a thread around them and the frilling between the guide and rollers, as described.

3. The combination, substantially as hereinafore set forth, of a frilling-guide, pressing-rollers which draw the frilling therefrom, spirals of different pitches rotating at different speeds on opposite sides of the guide, and a winding-thread carrier or guide rotating around the spirals to wind the thread around the frilling, as described.

4. The combination, substantially as hereinafore set forth, of a frilling-guide, pressing-rollers which draw the frilling therefrom, a single spiral on one side of the guide, a double spiral of greater pitch but revolving at less speed than the single spiral on the opposite side of the frilling-guide, and a winding-thread carrier or guide rotating around the frilling to wind a thread thereon, as described.

5. The combination, substantially as hereinafore set forth, of a frilling-guide, pressing-rollers which draw the frilling therefrom, a single spiral overlapping the frilling-edge of the guide and crossing the space between

said guide and the pressing-rollers, and a winding-thread carrier rotating around the spiral and the line of traverse of the frilling, as described.

6. The combination, substantially as hereinafore set forth, of a frilling-guide, pressing-rollers which draw the frilling therefrom, a double spiral opposite the band-edge of the guide crossing the space between said guide and the pressing-rollers, and a winding-thread carrier rotating around the spiral and the line of traverse of the frilling to wind the thread around them in the space between the guide and rollers, as described.

7. The combination, substantially as hereinafore set forth, of a frilling-guide, pressing-rollers which draw the frilling therefrom, rotating spirals on opposite sides of the guide and presser-rolls, a rotating thread-carrier laying a winding thread around the spirals and frilling, a steam-moistening vessel, a drying-plate, and guides thereover through which the band is drawn after passing between the pressing-rollers.

8. The combination, substantially as hereinafore set forth, of a frilling-guide, pressing-rollers which draw the frilling therefrom, rotating spirals on opposite sides of the guide and presser-rolls, a rotating thread-carrier laying a winding thread around the spirals and frilling, a steam-moistening vessel, and guides thereover through which the band is drawn after passing between the pressing-rollers to moisten the fabric.

9. The combination, substantially as hereinafore set forth, of pressing-rolls, a double spiral rotating adjacent thereto, a stud supporting its delivery end, and a winding-thread carrier rotating around the spiral in advance of the rollers to wind the thread thereon, as described.

10. The combination, substantially as hereinafore set forth, of a rotating ring or tube, a winding-thread carrier revolving therewith, a frilling-guide extending longitudinally through the tube, pressing-rollers in the plane of the guide in advance of its delivery end, rotating spirals on opposite sides of said guide and of the pressing-rollers, moistening and drying devices on the delivery side of the rolls, a guide overlying them, and means for actuating the moving parts, all co-operating as and for the purpose described.

London, September 6, 1886.

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