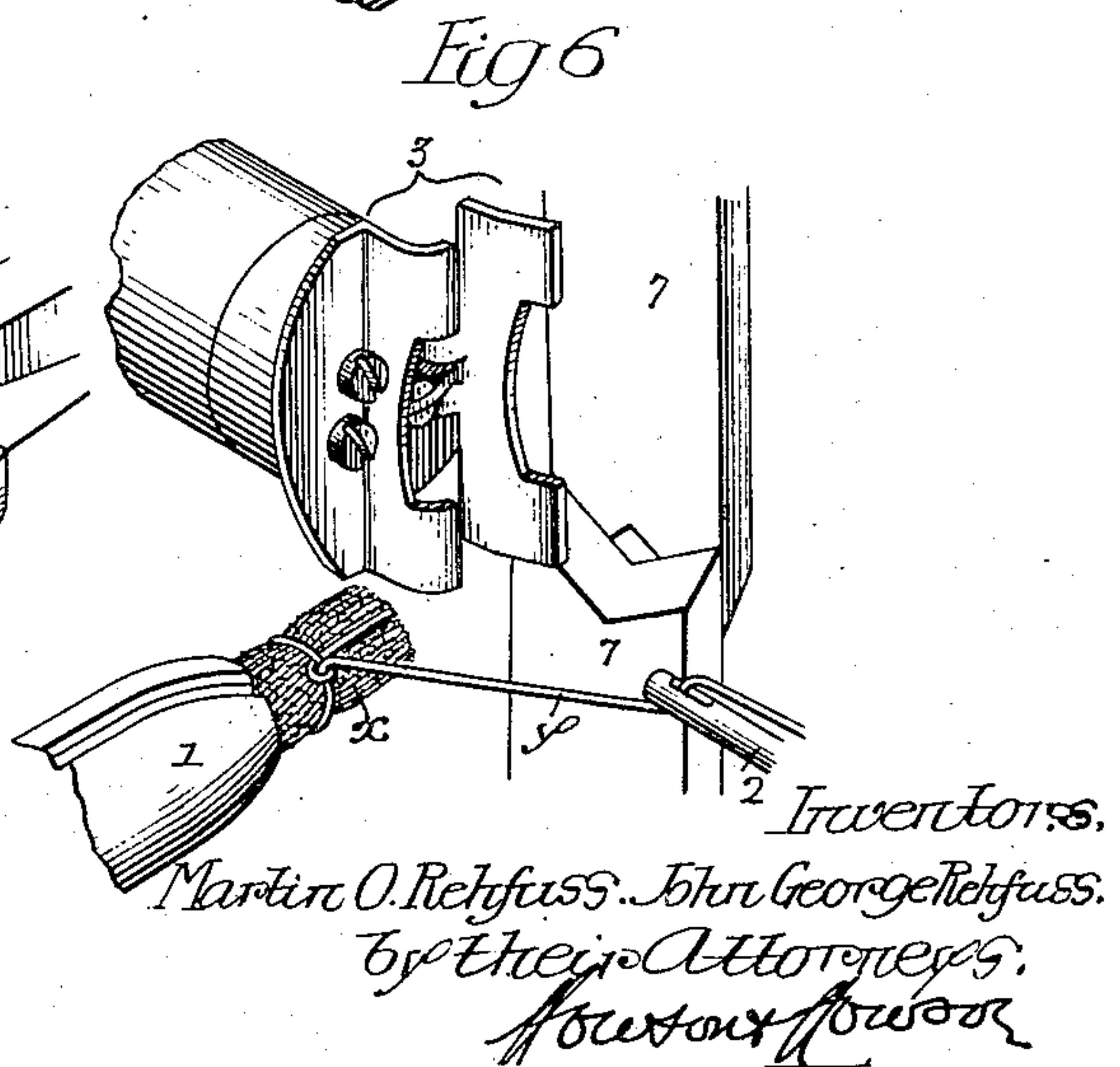
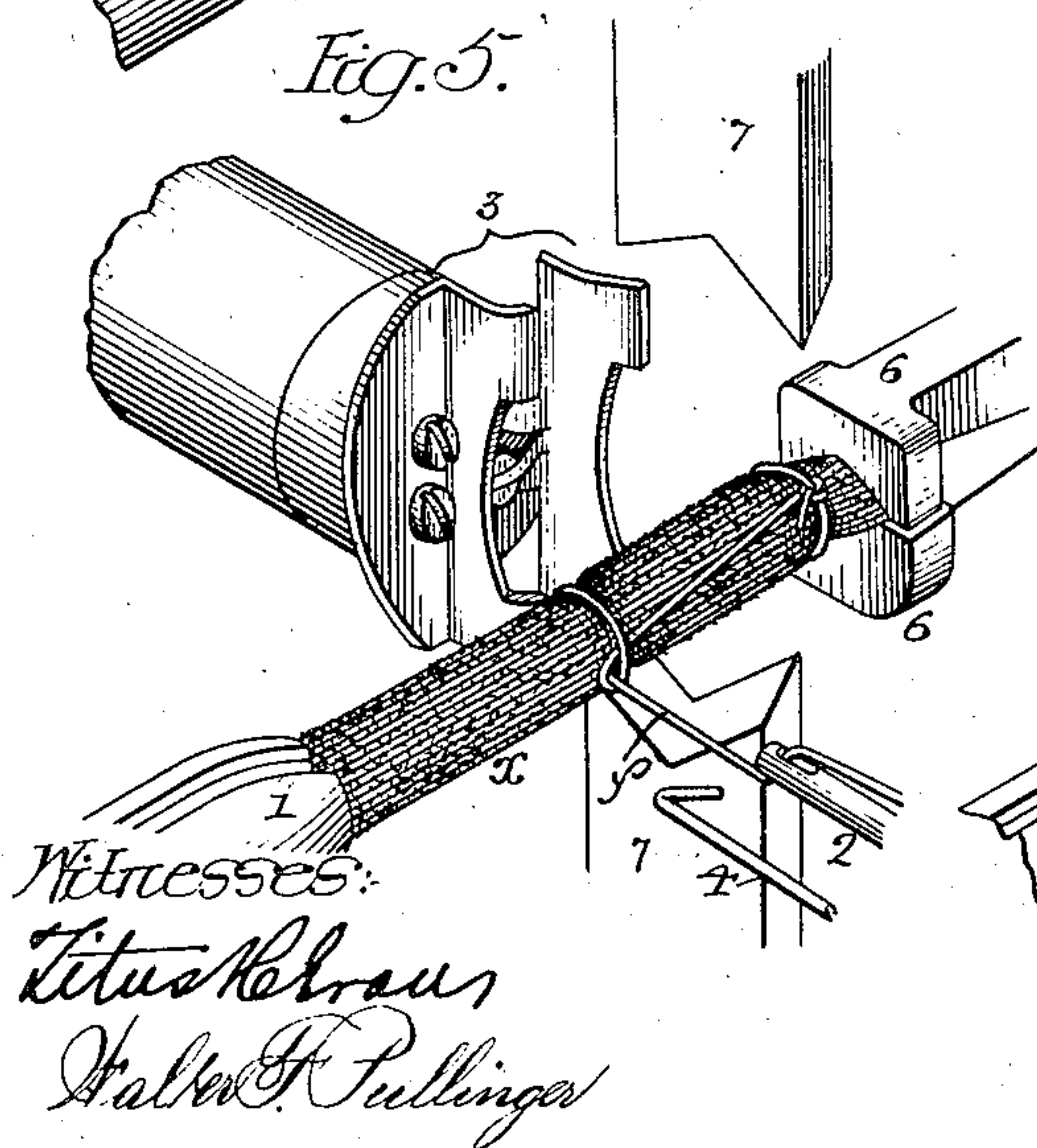
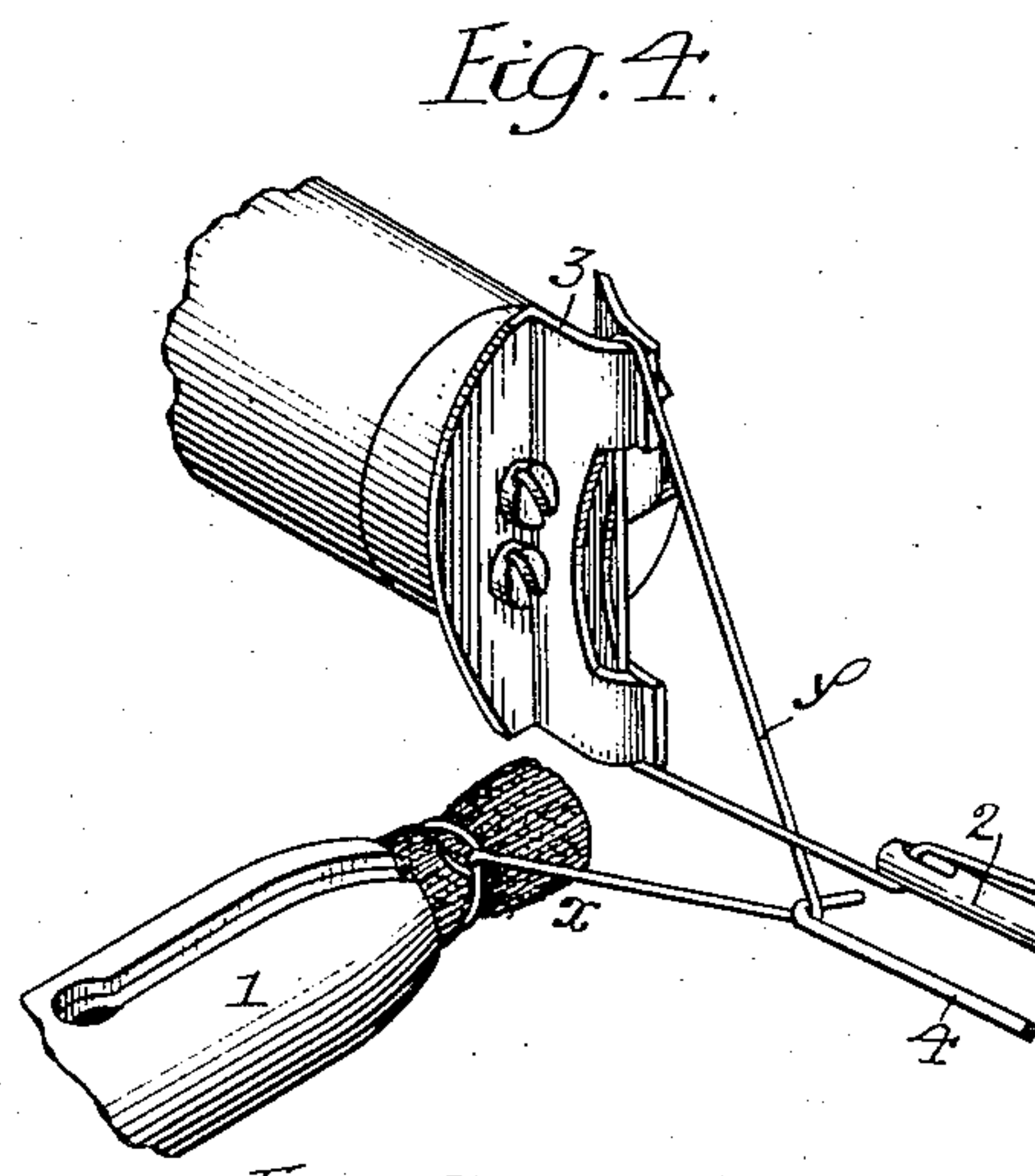
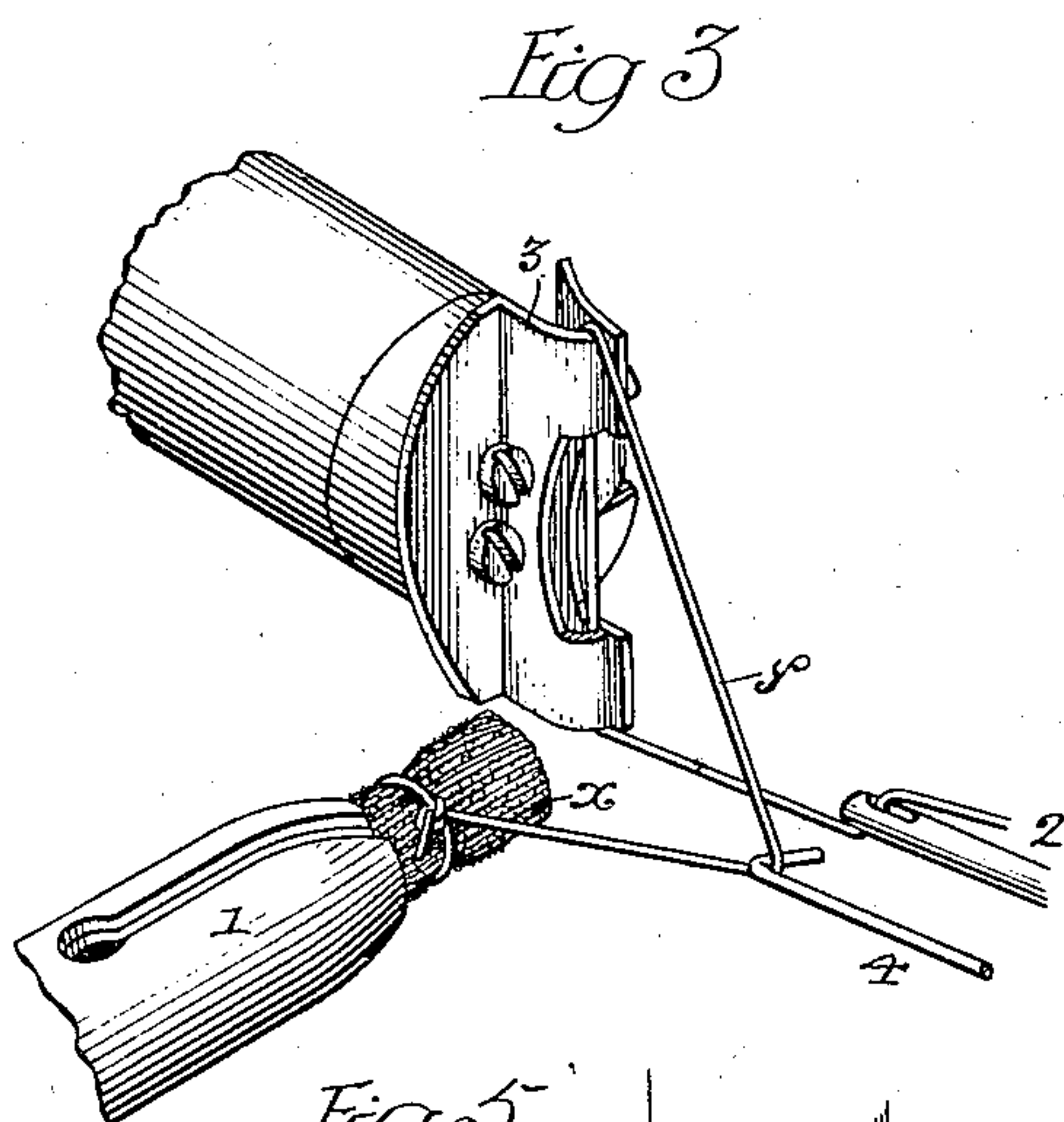
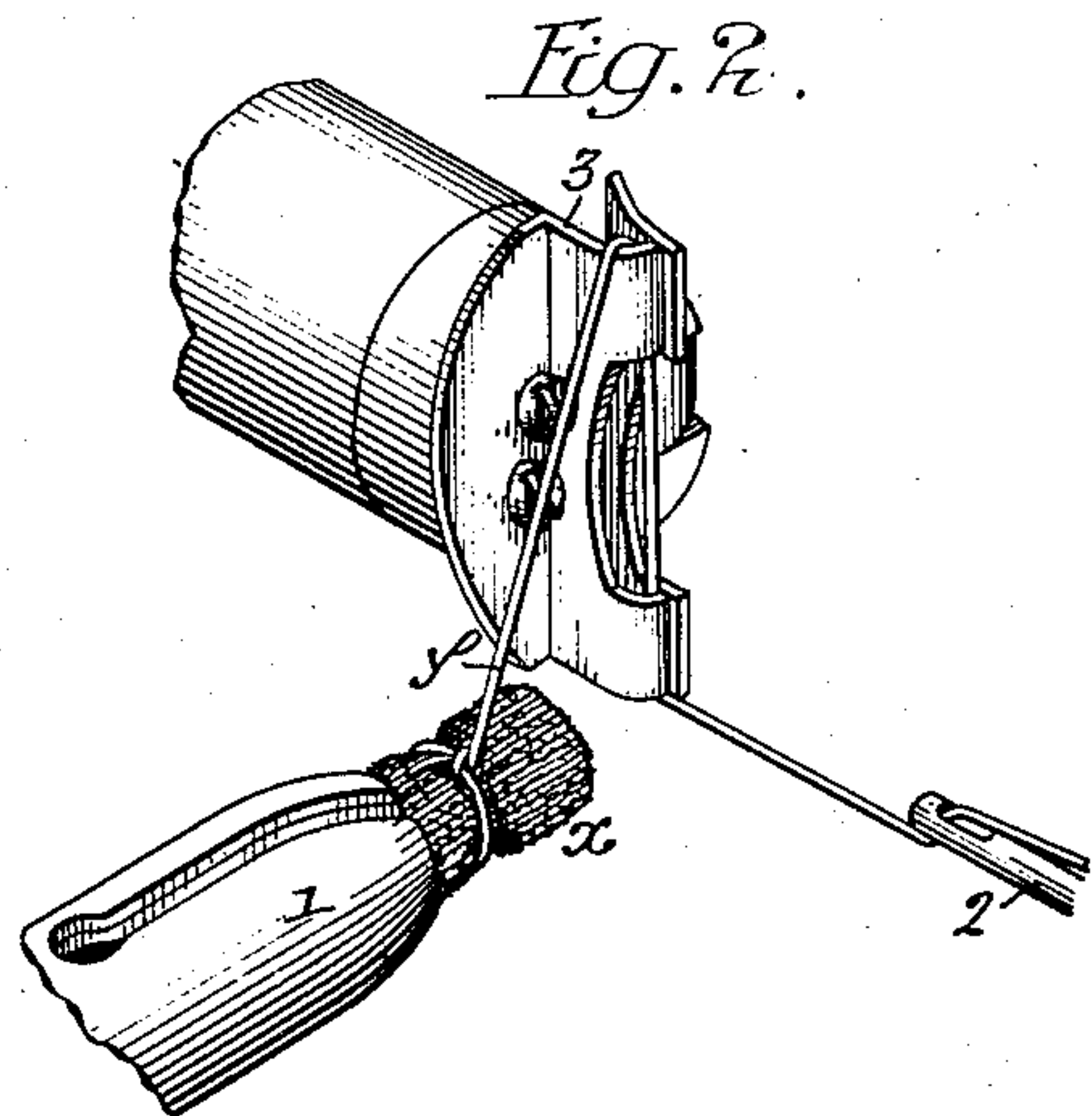
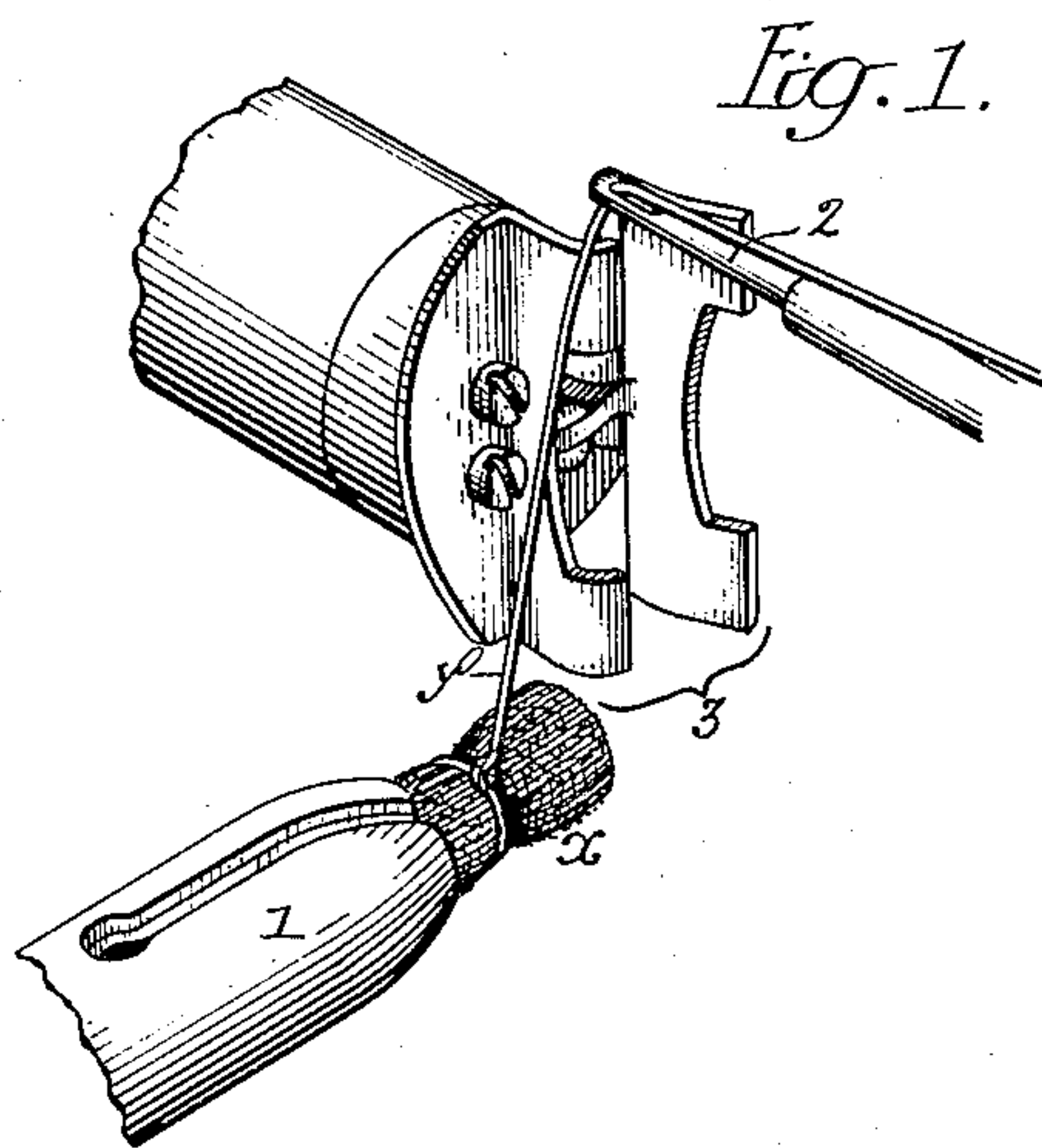


No. 850,053.

PATENTED APR. 9, 1907.

M. O. & J. G. REHFUSS.
TUFT FORMING MACHINE.
APPLICATION FILED OCT. 9, 1905.

4 SHEETS—SHEET 1.



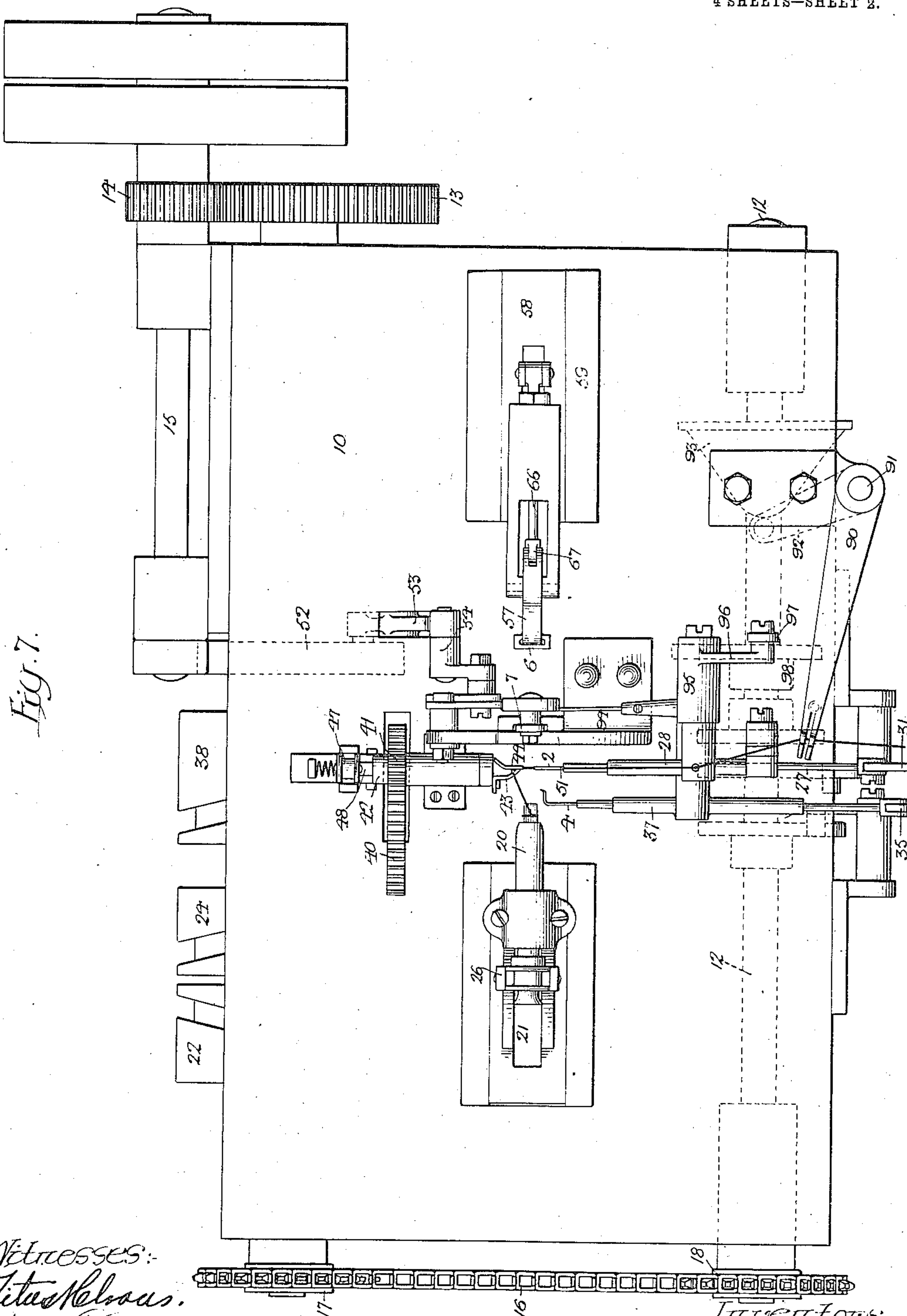
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4 SHEETS—SHEET 2.



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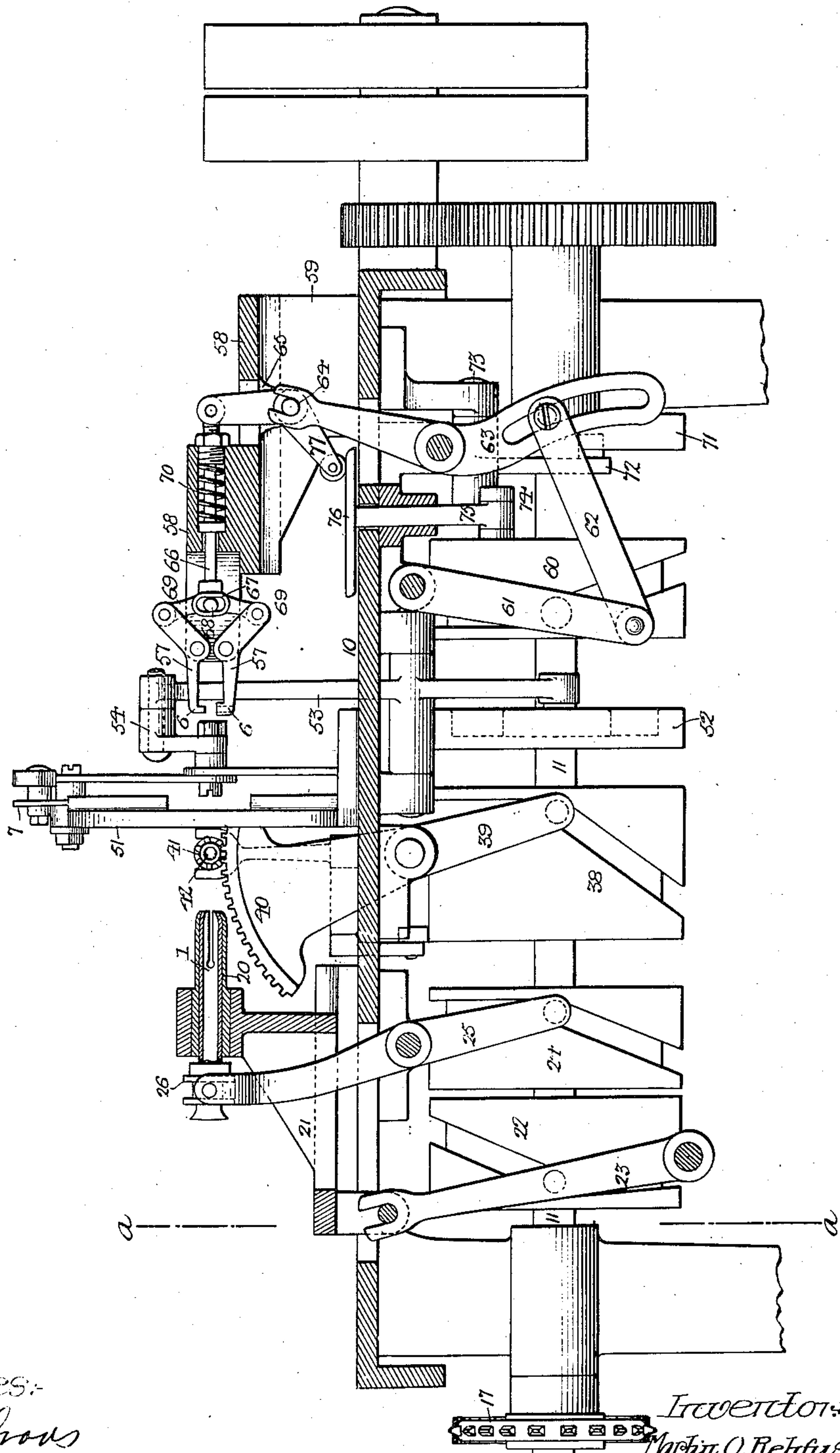
PATENTED APR. 9, 1907.

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TUFT FORMING MACHINE.

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4 SHEETS—SHEET 3.

Fig. 8.



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4 SHEETS—SHEET 4.

Fig. 9.

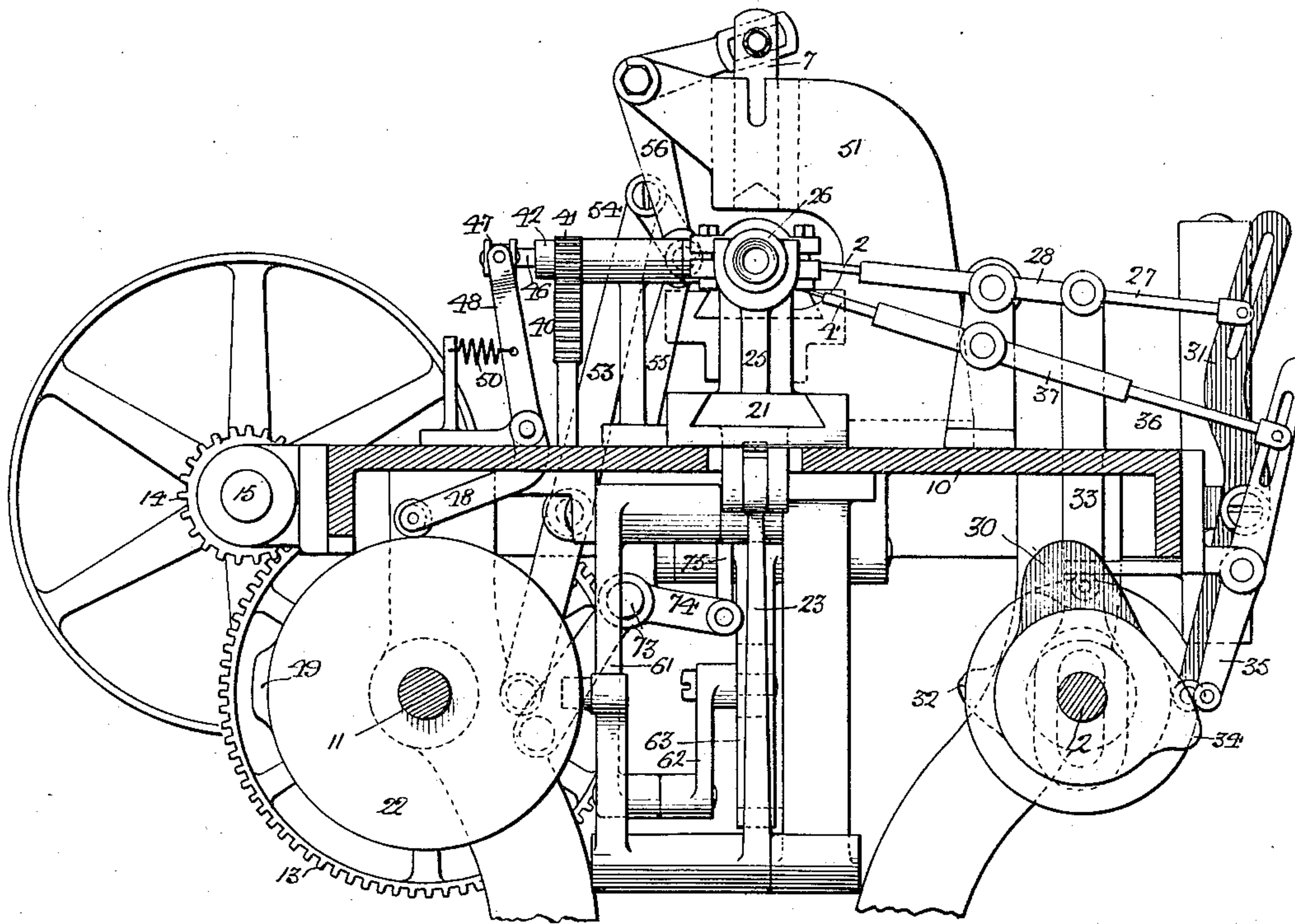
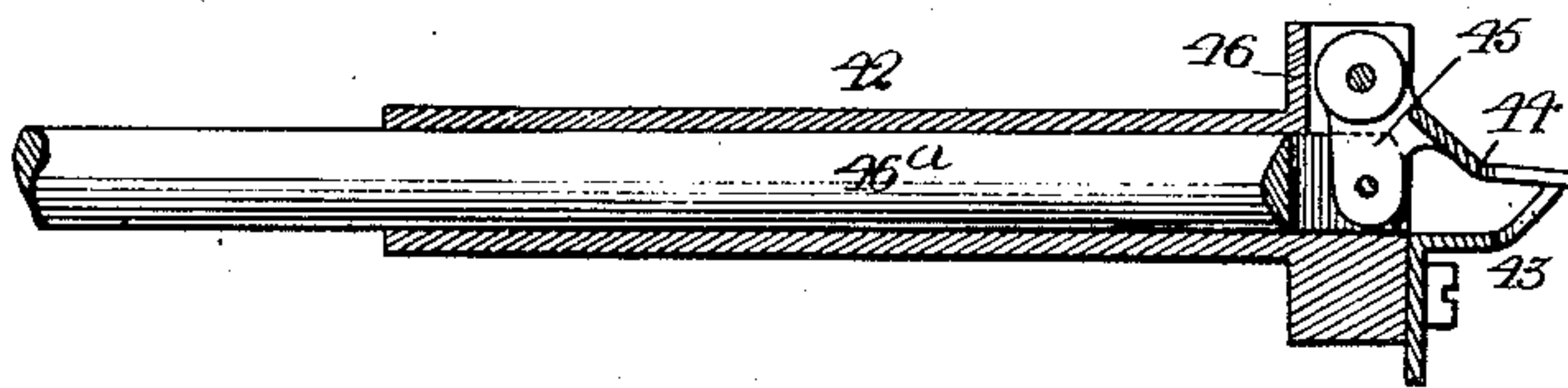


Fig. 10



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UNITED STATES PATENT OFFICE.

MARTIN O. REHFUSS AND JOHN GEORGE REHFUSS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE NATIONAL COTTON TUFT AND FIBRE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TUFT-FORMING MACHINE.

No. 850,053.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed October 9, 1905. Serial No. 282,037.

To all whom it may concern:

Be it known that we, MARTIN O. REHFUSS and JOHN GEORGE REHFUSS, citizens of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Tuft-Forming Machines, of which the following is a specification.

The object of my invention is to provide a machine for making "tufts," meaning by this term a bunch of strands or fibers lying parallel or substantially parallel with each other and confined together by an enveloping or tying cord whose ends are secured together, so as to prevent accidental displacement.

In the accompanying drawings, Figures 1 to 6 are perspective views illustrating the essential elements of the machine and the manner in which they coöperate in the formation of the tuft. Fig. 7 is a plan view of an organized machine for forming the tufts. Fig. 8 is a longitudinal section of the same. Fig. 9 is a transverse section on the line *a a*, Fig. 8; and Fig. 10 is an enlarged sectional view of one of the elements of the machine.

Referring first to the first six figures of the drawings, it will be noted that the essential features of the machine are a tubular guide 1 for the bunch or series of strands or yarns *x* of which the tufts are to be made, a needle 2 for controlling the tying yarn or cord *y*, a twister 3 for said tying yarn or cord, a looper 4, a take-up device, a pair of drawing-nippers 6, and a pair of cutting-knives 7. In the first instance the bunch of strands *x* is drawn through the feeder 1 so as to project to some extent beyond the end of the same, the feeder being split at its forward end, so as to form a pair of jaws which can be compressed to grip the strands *x* or relieved from pressure, so as to release said strands. In starting the operation the end of the tying-cord *y* is drawn from the take-up device through the eye of the needle 2 and is tied around the bunch of strands *x*, projecting from the end of the feeder 1. The needle is then adjusted so that its eye is in a position above the twister 3, while the jaws of the latter are open, as shown in Fig. 1. A downward movement is then imparted to the needle, so as to carry the cord *y* into the twister, and the jaws of the latter are then closed, and

the needle is retracted, as shown in Fig. 2. The looper 4 now advances, engages that portion of the cord *y* between the feeder 1 and the twister 3, and is then retracted, so as to form a loop of said cord *y*, as shown in Fig. 3. The twister 3 is then rotated, so as to twist together that portion of the cord *y* which is engaged by the needle-eye and that portion which is engaged by the looper, as shown in Fig. 4. The feeder 1 then advances to such a point that the projecting strands, with their original tie, will project through the loop of tying-cord *y*, so that they can be engaged by the nippers 6, as shown in Fig. 5, the strands being then released from the grip of the feeder 1 by slacking the jaws of the latter and the nippers 6 being retracted, so as to pull a fresh supply of strands *x* through the loop of tying-cord and between the fixed and movable blades of the knife 7, as also shown in Fig. 5, this operation freeing the tying-cord *y* from the looper 4. The take-up now operates to tighten the loop of cord *y*, the tension thereby imparted to the said loop pulling it from between the jaws of the twister and binding it tightly around the strands which have been drawn from the feeder by the action of the nippers 6. (See Fig. 5.) The upper knife 7 then descends, so as to sever the strands *x* and cord *y* between the original tie and the one which has just been completed, and the feeder 1 then again closes upon the strands *x* and is retracted, as shown in Fig. 6, prior to the advance of the needle 2 to the position shown in Fig. 1 preparatory to a repetition of the operation.

The organized machine for performing the above-described operations is shown in Figs. 7, 8, and 9, said machine having a fixed bed or table 10, which has depending bearings for two cam-shafts 11 and 12, the shaft 11 being driven by spur-gears 13 and 14 from a driving-shaft 15 at one side of the machine and the shaft 12 being driven from the shaft 11 by means of a chain belt 16 and a pair of sprocket-wheels 17 and 18, as shown in Fig. 7. The feeder-tube 1 is mounted so as to be free to slide in a tubular guide 20, which is carried by a slide 21, mounted in suitable guides on the table 10 and reciprocated at the proper times by means of a cam 22 on the shaft 11 through the medium of a lever 23.

The forward end of the tubular guide 20 is slightly coned, and opening and closing movements of the jaws of the feeder-tube 1 are caused by imparting to said feeder-tube longitudinal movement of a limited extent in the tubular guide 20, such movement being effected by means of a cam 24 on the shaft 11, said cam acting through the medium of a lever 25, whose upper end is forked and has pins engaging a grooved collar 26 on the feeder-tube, as shown in Figs. 7 and 8. The bar 27, which carries the needle 2, is free to slide in a tubular guide 28, which is mounted so as to be free to rock in a bearing in a standard on the table 10, the sliding movement of the needle-bar being effected by a cam 30 on the shaft 12 acting through the medium of a lever 31, as shown in Fig. 9, and the vertical swinging movement of the needle being effected by a cam 32 on the shaft 12, which cam acts on an anti-friction-roller on a bar 33, vertically guided in the table 10 and yoked at the lower end, so as to embrace the shaft 12, the upper end of said bar being pivotally connected to the rear end of the guide-tube 28. The lever 31 is suitably slotted to permit of the rising-and-falling movements of the rear end of the needle-bar 27. The advancing and retracting movements of the looper are effected by a cam 34 on the shaft 12, said cam acting through the medium of a lever 35, which is slotted for engagement with the rear end of the looper-rod 36, the latter being adapted to a swinging tubular guide 37, similar to that which receives the needle-bar 27. Rotative movement is imparted to the twister 3 by means of a cam 38 on the shaft 11, said cam acting through the medium of a lever 39, one arm of which forms a toothed segment 40, which meshes with a pinion 41 on a tubular shaft 42, the latter turning in a suitable bearing mounted upon the table 10.

The twister has, as shown in Fig. 10, a fixed jaw 43, bent at the outer end, and a swinging jaw 44, which can be closed against the bent end of the fixed jaw or retracted therefrom, so as to permit of the introduction of the tying-cord y between the two jaws by the swinging action of the needle 2, the bent end of the jaw 43 being beveled, so that when the loop of tying-cord is subjected to tension it will automatically open the jaws of the twister and escape therefrom. The movable jaw 44 of the twister forms part of a lever 45, suitably pivoted to a head 46 on the shaft 42, said head also carrying the fixed jaw 43, and the lever 45 is connected to a rod 46^a, which passes through the tubular shaft 42 and has at its rear end a grooved collar 47, engaged by inwardly-projecting pins carried by the forked upper end of a lever 48, which is acted upon by a lug 49 on the cam 38, so as to open the jaws at the proper time. When the lever 48 is

free from the influence of the lug 49, the jaws are closed by the action of a spring 50, as shown in Fig. 9.

The cutting-knife 7 is vertically guided in a standard 51 on the table 10, and vertical movement is imparted to said knife by means of a cam 52 on the shaft 11, said cam acting upon a lever 53, whose upper end is connected by a link 54 to an arm 55 and a lever 56, the other arm of said lever 56 being slotted for engagement with a pin or stud on the upper end of the sliding knife 7, as shown in Fig. 9, the lever 56 and arm 55 forming a toggle.

The nippers 6 comprise a pair of swinging jaws, each forming part of a lever 57, said levers being pivoted in the forked front end of a slide 58, which is suitably mounted on an elevated guide 59 on the table 10, reciprocating movement being imparted to this slide by means of a cam 60 on the shaft 11, said cam acting upon a lever 61, which is connected by a link 62 with the slotted arm of a second lever 63, the other arm of said lever 63 being forked for engagement with a pin 64, which is carried by a bracket 65, depending from the slide 58, as shown in Fig. 8, the extent of reciprocating movement of the slide being varied as desired by adjusting the connection between the lever 63 and link 62.

The nipper-jaws are opened and closed by means of a reciprocating rod 66, suitably guided on the slide 58 and having a yoked end 67, which acts upon a pin 68, carried by links 69, pivoted to the levers 57, the rod 66 being moved forwardly in order to close the nipper-jaws by the action of a spring 70 on the slide 58 and being retracted so as to open the jaws by the action of a cam 71 on the shaft 11, said cam acting upon an arm 72, which is carried by a rock-shaft 73, the latter having another arm 74, which is connected to the stem 75 of a platen 76 above the table 10, said platen serving as a guide for an anti-friction-roller carried by a bell-crank lever 77, which is pivoted to the pin 64 and connected to the rod 66, whereby the latter may be acted upon in any position of the slide 58.

The take-up arm 90 is hung to a vertical shaft 91, which has another arm 92, provided with an anti-friction-roller acted upon by a cam 93 on the shaft 12, as shown by dotted lines in Fig. 7.

The tied and severed tuft is delivered from the machine by the blow of a striker-arm 94, projecting from a rocker-head 95, which has an arm 96, with depending member 97, acted upon by a cam 98 on the shaft 12. (See dotted lines, Fig. 7.)

Instead of using a take-up independent of the needle for the purpose of tightening the loops of tying-cord upon the bunch of tufting-strands such tightening action may, if desired, be effected by retracting movement of

the needle itself, although the use of an independent take-up device is preferred.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. In a tuft-forming machine, the combination of a feeder for the tufting-strands, a needle for the tying-cord, means for first forming a loop of tying-cord, then twisting the ends of said loop, then projecting the tuft-forming strands into the loop, and then tightening the latter upon said strands.

2. In a tuft-forming machine, the combination of means for forming a succession of properly spaced and secured loops of tying-cord around the tufting-strands, means for feeding said tied strands forwardly, and means for cutting the strands between successive tying-loops.

3. In a tuft-forming machine, the combination of a feeder for the tufting-strands, a needle carrying a tying-cord, a twister having jaws for engaging said tying-cord, a looper for said tying-cord, and means for rotating the twister.

4. In a tuft-forming machine, the combination of a feeder for the tufting-strands, a needle for the tying-cord, a twister having jaws for engaging said tying-cord and means for moving the needle from and toward said twister, and also across the same, so that it can lay the tying-cord in the jaws of the twister.

5. In a tuft-forming machine, the combination of a feeder for the tufting-strands, a needle for the tying-cord, a twister having jaws for engaging said tying-cord, means for moving the needle from and toward said twister and also across the same, so that it can lay the tying-cord in the jaws of the twister, and means for opening and closing said jaws.

6. In a tuft-forming machine, the combination of a feeder for the tufting-strands, a needle for the tying-cord, a twister having jaws for engaging said tying-cord, means for moving the needle from and toward said twister, and also across the same, so that it can lay the tying-cord in the jaws of the twister, said jaws being so formed as to permit of the release of the tying-cord therefrom when said tying-cord is subjected to tension.

7. In a tuft-forming machine, the combination of a feeder for tufting-strands, a needle carrying a tying-cord, a twister having jaws for engaging said tying-cord, a looper for engaging said tying-cord, and means for rotating the twister and reciprocating the needle and looper.

8. In a tuft-forming machine, the combination of a feeder for tufting-strands, a needle carrying a tying-cord, a twister having jaws for engaging said tying-cord, a looper for engaging said tying-cord, and means for rotating the twister, reciprocating the looper, and imparting a combined sliding and swinging movement to the needle.

9. In a tuft-forming machine, the combination of a feeder for the tufting-strands, a needle carrying a tying-cord, a twister engaging said cord, a looper also engaging the same, and a take-up device acting independently of the needle for tightening the loop of tying-cord upon the tufting-strands.

10. In a tuft-forming machine, the combination of a feeder for the tufting-strands, nippers for engaging said tufting-strands and pulling them forward from the feeder, and means for looping a tying-cord for said strands and twisting the loop.

11. In a tuft-forming machine, the combination of means for looping a tying-cord and twisting the loop, a feeder for the tufting-strands, and nippers for engaging said tufting-strands and drawing them from the feeder, said feeder and nippers being on opposite sides of the looping and twisting devices.

12. In a tuft-forming machine, the combination of looping and twisting devices for a tying-cord, a feeder for the tufting-strands, nippers for engaging said strands and drawing them from the feeder, and a cutting-knife for severing the strands at a point between the feeder and nippers.

13. The combination, in a tuft-forming machine, of a tubular feeder for the tufting-strands having jaws for gripping the said strands, a tubular guide for said feeder, and means for moving the feeder independently of the guide, so as to effect opening-and-closing movement of the jaws of the feeder.

14. A tuft-forming machine having in combination, a feeder for the tufting-strands, nippers for engaging said strands and drawing them from the feeder, means for forming and twisting a loop of tying-cord, and means for moving said strands, feeder and nippers from and toward each other.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

MARTIN O. REHFUSS.

JOHN GEORGE REHFUSS.

Witnesses:

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