

No. 636,402.

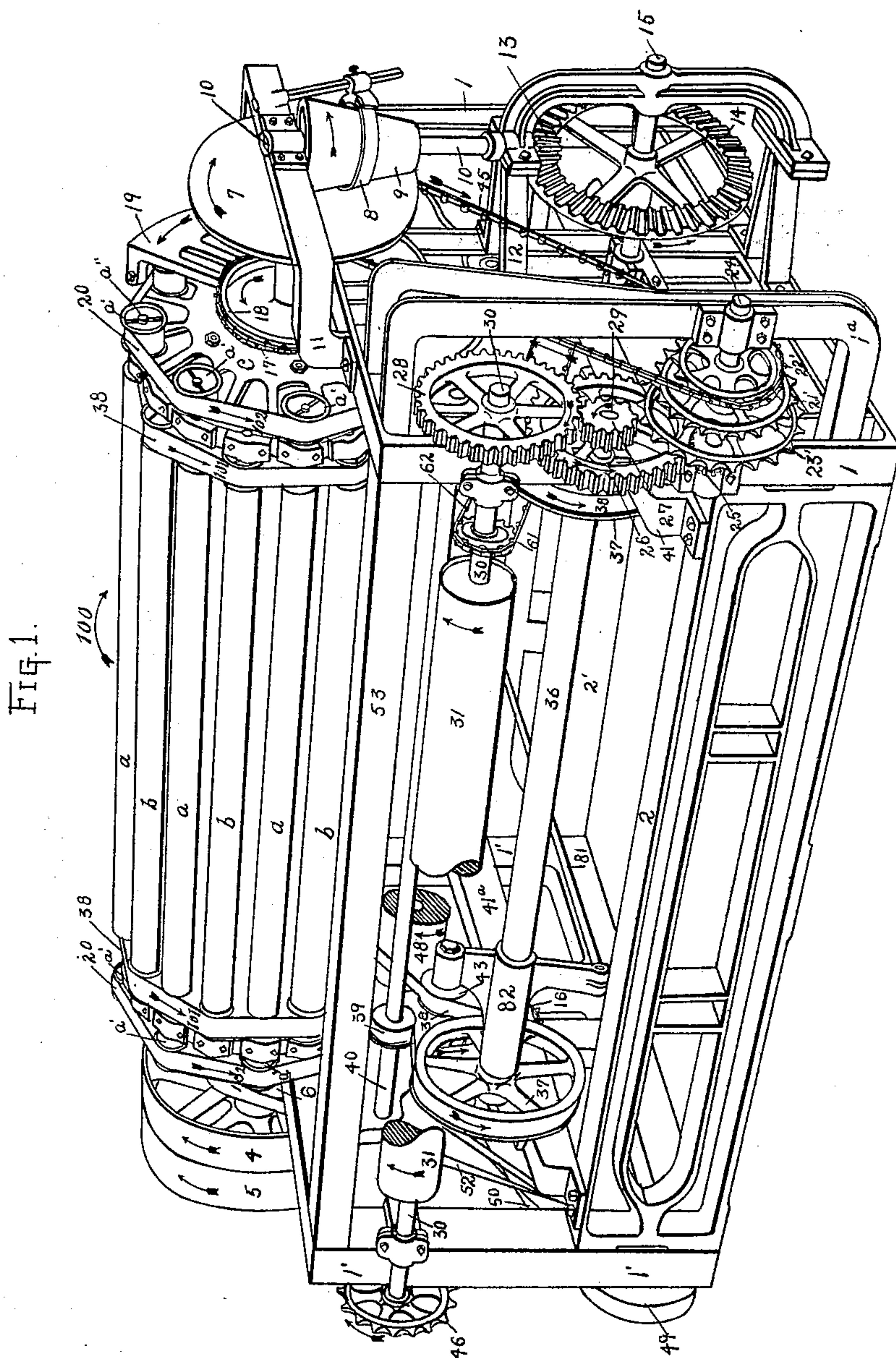
Patented Nov. 7, 1899.

D. GESSNER.
NAPPING MACHINE.

(Application filed Mar. 28, 1898.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses;
M. Wilson
C. J. Rathjen

Inventor: David Gessner
by Lyford & Bell Attys

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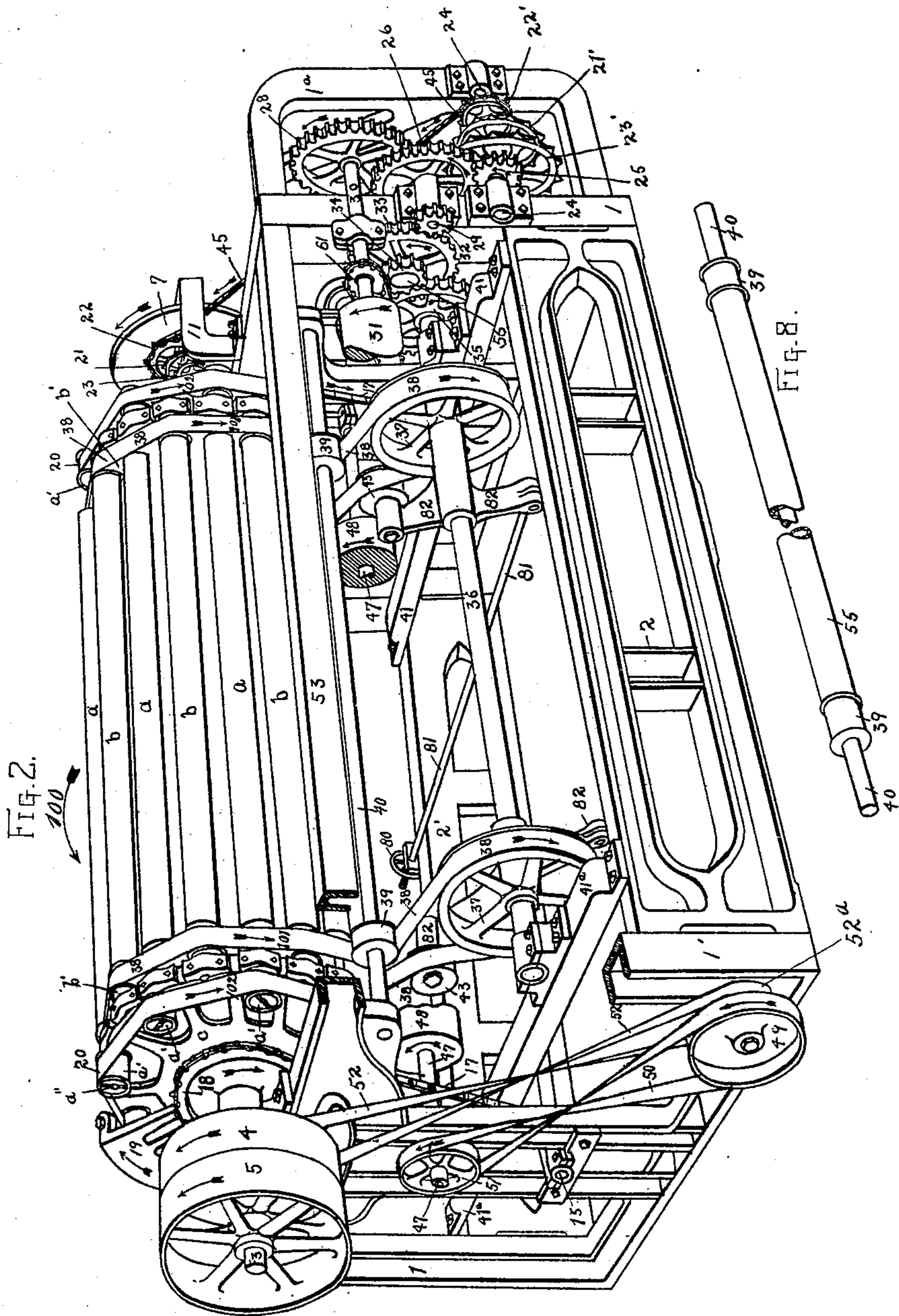
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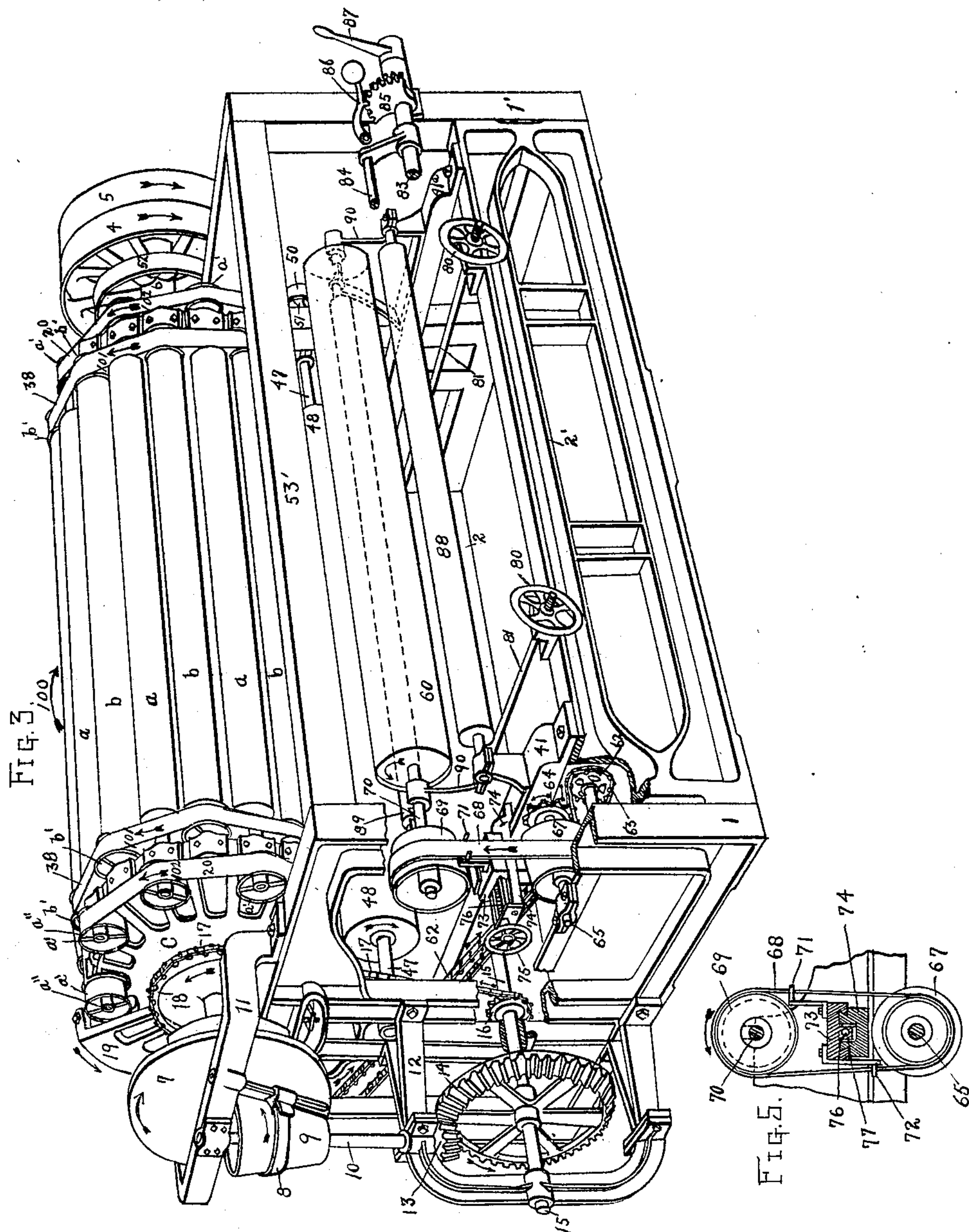
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4 Sheets--Sheet 3.



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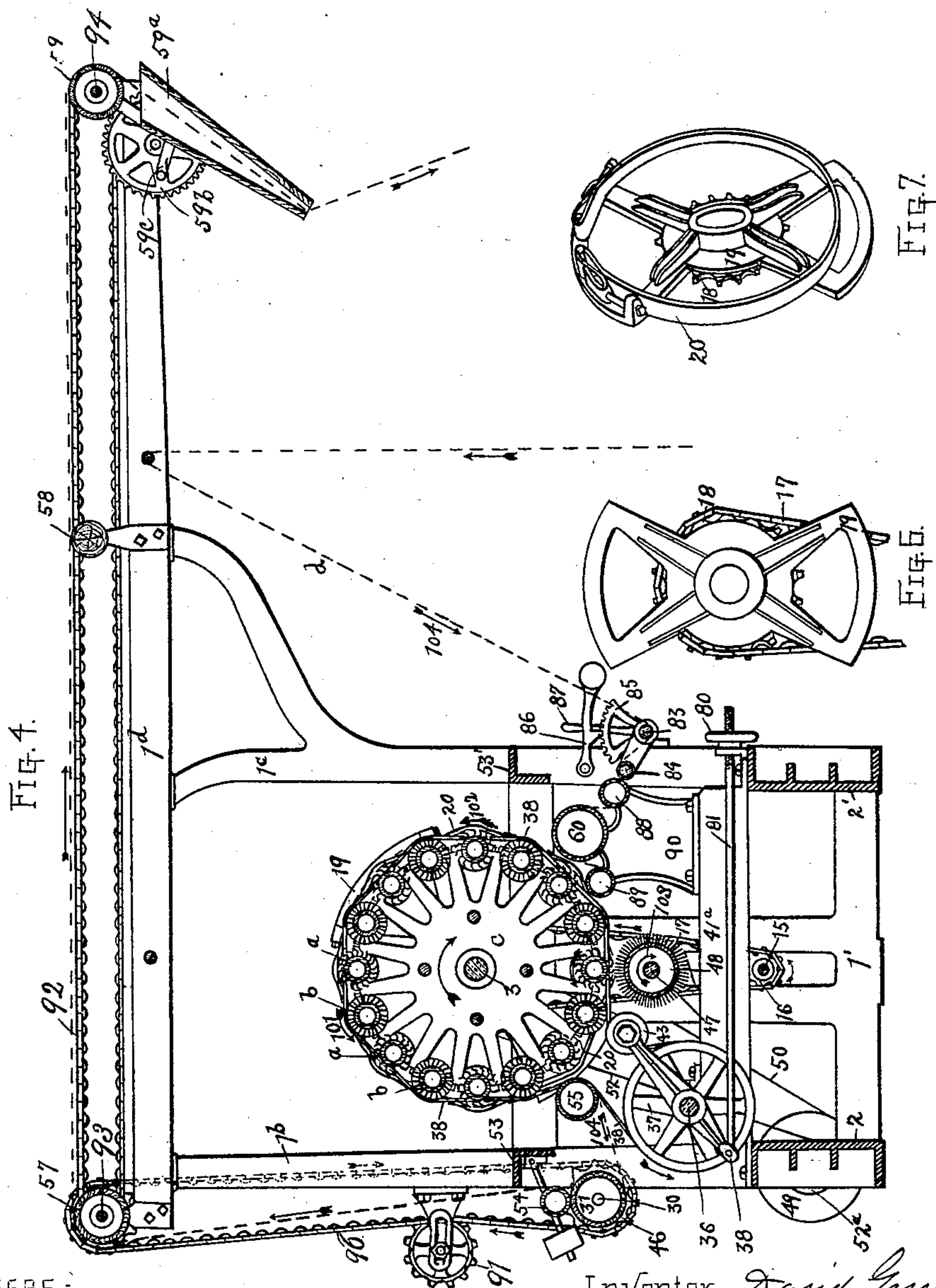
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

DAVID GESSNER, OF WORCESTER, MASSACHUSETTS.

NAPPING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 636,402, dated November 7, 1899.

Application filed March 28, 1898. Serial No. 675,520. (No model.)

To all whom it may concern:

Be it known that I, DAVID GESSNER, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Napping-Machines, of which the following is a specification.

In the accompanying drawings, Figures 1 and 2 are perspectives of the machine, showing, respectively, the rear with one end and the rear with the opposite end. Fig. 3 is a perspective, with certain mechanism omitted, showing the front with one end. Fig. 4 is a cross-section taken in a plane at the middle of the drum. Figs. 5, 6, 7, and 8 are details.

The frame is composed of the upright end pieces 1 1', connected at the bottom by the girders 2 2', which are united again crosswise by brackets or stays 41 and 41^a, and at the top by the girders 53 and 53' and carries upward extensions 1^b 1^c and horizontal member 1^d, and a yoke on the side, (marked 1^a.)

3 is the main shaft, carrying the heads *c c*, on the outer periphery of which heads are mounted the napping-rollers *a* and the contact-rollers *b*, which I call "crimper-rolls," because their contact against the ends of the napped fibers serves to bend or crimp the fibers with a result on the whole analogous to felting.

4 is the fast pulley, by which the main shaft is driven, and 5 is the loose pulley.

6 is a pulley fast on the main shaft, from which by the belt 52 is driven a pulley 52^a, fast on the inside of pulley 49, from which the shaft 47 is driven through the belt 50 and pulley 51. The stripper roll or fancy 48 is fast on the shaft 47.

The napping-rolls *a* are covered with card-clothing, the points of which are inclined in the direction in which they act upon the cloth. The crimper-rolls *b* are covered with card-clothing having substantially straight or radial points. The napping-rolls at their points of contact with the cloth move in non-unison with the cloth, so that their points raise the nap. The two series of rolls act differentially, the napping series serving, as it were, to comb out the nap and the crimper series serving to crimp or felt the nap.

The mechanism for driving the napper-rolls *a* is similar to that shown in my application, Serial No. 531,444, filed December 11, 1894. It consists of the disk 7, fast to the main shaft 3, the belt 8 and conical roller 9 cooperating with said disk, the shaft 10, upon which said conical roller is mounted, having its bearings in the brackets 11 and 12 and carrying at its lower end the pinion 13, which drives the gear 14, fast upon the counter-shaft 15. Upon this counter-shaft are fixed on the inside of the frame sprocket-wheels 16 16, (there being one for each end of the machine,) from which, through the sprocket-chains 17, are driven the sprocket-wheels 18 18, (there being one at each end of the napping-cylinder,) fast to the spiders 19, which carry the belt 20, which passes around the series of pulleys *a' a'* on the ends of the shafts *a''* of the workers *a*. By raising or lowering the belt 8 any desired speed may be given to the workers *a* for increasing or decreasing their napping capacity independent of the speed at which the cloth may be running and independent of the speed at which the travelers *b* may be running, and independent also of the speed at which the main shaft is running.

The mechanism for driving the cloth-feed rolls, of which 31 is one, is as follows: 21, 22, and 23 are sprocket-wheels fast to the main shaft. 21', 22', and 23' are corresponding sprocket-wheels fast to the counter-shaft 24. 45 is the sprocket-chain, by shifting which from one pair of said sprocket-wheels to another the speed of the counter-shaft 24 may be varied with respect to the speed of the napping-cylinder. 25 is a pinion fast on the shaft 24 and which drives a gear 26, fast on the shaft 29. The pinion 27 is fast to the gear 26 and drives the gear 28, fast on the shaft 30, to which shaft the cloth-feed roll 31 is fast. On the opposite end of the shaft 30 is fixed the sprocket 46, from which may be driven all other cloth-feed rolls in the machine.

The entrance tension-roll 60 is driven as follows: On the shaft 30 of the rear draft-roll 31 is fast a sprocket-wheel 61, which drives a chain 62, which drives a sprocket 64, fast on a shaft 65, carrying a cone 67, which drives a belt 68, which drives cone 69, fast on shaft 70

of said entrance tension-roll 60. The chain-idler 63 serves as a take-up for chain 62. By shifting the belt 68 on the cones 67 and 69 the speed of the entrance tension-roll 60 may be varied at will relatively to the speed of the other feed-rolls and traveler-rolls. This adjustment is a feature of the utmost importance, because it vastly increases the scope of the machine with respect to the range of materials which may be successfully treated by the workers *a*. For the purpose of enabling this adjustment to be made while the machine is running and to be regulated to a nicety the following mechanism is provided, whereby the operator may shift the belt 68: 71 and 72 are belt-forks fastened to carriage 73, which is made to slide upon ways on the bracket 74, fast to bracket 41. By a screw-spindle 76, with hand-wheel 75, nut 77, fast to carriage 73, is moved so as to shift said forks and belt 68 at will by the operator while the machine is running.

By the adjustment last described the tension of the fabric being treated can be regulated to suit very tender fabrics, which by too great a tension are liable to be torn or stretched and narrowed and by too little tension are liable to be dragged forward by the workers *a*, and thus slacked up in a manner, causing disaster.

The mechanism for driving the crimper-rolls *b* is as follows: Upon the opposite end of the shaft 29 from the gear 26 (see Fig. 2) is fixed a pinion 32, which drives a gear 33, turning upon a stud 56. The gear 34 is fastened to the gear 33 and drives gear 35, fixed on the shaft 36, having its bearings upon the stays or brackets 41 41^a. The pulleys 37 37 are fixed on the shaft 36 and drive the belts 38 38, which extend around the pulleys *b'* at opposite ends of the crimper-rolls *b*. These belts 38 38 run under the idlers 39 39 and over the idlers 43 43, respectively, so as to substantially encircle all of the travelers *b*. Whenever the chain 45 is shifted from one pair of sprocket-wheels to another for the purpose of varying the speed of the cloth relatively to the speed of the main shaft a corresponding variation will be produced in the speed of the belts 38 38. Wherefore any change in the speed of the cloth-feed rolls, as 31, will be accompanied by a corresponding change in the speed of the crimper-rolls *b*.

In the particular form of my machine shown in the accompanying drawings the mechanism above described is so proportioned that the surface speed of the cloth-feed rolls, as 31, is substantially the same as the surface speed of the crimper-rolls *b*, which surface speed of the crimper-rolls *b* is the resultant between the speed of the crimper-rolls *b* upon their own axes and the speed at which they are carried bodily by the cylinder-heads *c*. In other words, if the diameter of each pulley *b'* is the same as the diameter of their respective crimper-rolls *b* the belts 38 38 may have substantially the same speed as that at

which the cloth being treated is traveling through the machine. The relationship between the speed of the crimper-rolls and of the feed is maintained constant in the operation of the machine notwithstanding and independently of any variation which may be made in the speed of the working rollers *a* or of the main shaft. The shaft 29 constitutes a common actuator for the cloth-feed rolls and the crimper-rolls. The connections between this common actuator 29 and the cloth-feed rolls, as 31, are invariable. Likewise the connections between this common actuator 29 and the crimper-rolls *b* are invariable, so that for a given speed of this common actuator a corresponding speed will be communicated both to the crimper-rolls and the cloth-feed rolls, and the speed of one will be invariable with respect to the speed of the other. In the connections, however, by which the common actuator is driven the shifting of the sprocket-chain 45 affords a speed adjustment whereby the speed of the common actuator 29 may be varied with respect to the speed of the other parts of the machine.

The belt 38 can be taken up and tightened by turning the hand-wheels 80, which are screw-threaded to the rods 81, that engage, respectively, with the swing-arms 82, which are loosely mounted on shaft 36 and carry on their free ends the idlers 43.

The broken line *d* indicates the cloth being treated. In leaving the napping-rolls it passes under a roll 55, (shown in Figs. 4 and 8,) fast to the two idlers 39 39, and turned with them at the same surface speed as the surface speed of the crimper-rolls *b* by the power of belts 38 38. Thence it passes under and partly around the feed-roll 31 and under weighted roll 54 and upward and over driven feed-roll 57, over idler 58 (overhead of the operator) and driven feed-roll 59, whence it is delivered through folder 59^a behind the operator. The chain 96 is held taut by the idler 91 and drives the shaft 93, to which the feed-roll 57 is fixed. Thence the driving power is transmitted through chain 92 to shaft 94, on which feed-roll 59 is fixed. Thence the driving power is applied to vibrating the folder 59^a through the wheel 59^b and connecting-rod 59^c. The cloth enters the machine under the bar 83 and over the adjustable tension-bar 84, the adjustment of which is controlled by segment 85, catch 86, and hand-lever 87, at the end of the bar 83. Thence it proceeds under idler 88, over the tension-roll 60, under and around idler 89, directly in front of the napping-cylinder. The idlers 88 89 and tension-roll 60 are mounted in brackets 90, which are fastened to brackets 41 and 41^a, extending across between the girders 2 and 2'.

The directions of movement of the drum-cylinder of each series of napping-rolls and of the cloth are respectively indicated by the arrows 100, 101, 102, and 104. The direction in which the brush 48 moves is indicated by the arrow 103.

By the use of the machine above described manufacturers of knitted goods are now napping so-called "flat" goods, "straight-ribbed" goods, and "jersey-ribbed" goods, none of which goods, to the best of my knowledge, had ever before been successfully napped on planetary nappers. Moreover, on other knitted goods, such as "fleece backs" or "plush backs," and such woven goods as "flannel-ettes" and kindred fabrics as had before been napped by planetary nappers, the nap now being produced by my machine is so far different and better as to make this kind of cloth practically a superior material, the nap being very much shorter, thicker, more evenly distributed, and velvety, being also much less matted into knots or bunches by rubbing or washing, the fabric handling much thicker and fuller even after washing and use. In accomplishing these results my machine removes and wastes less stock and is successful with goods woven or knitted from the ordinary unselected staple, thus turning out a better-finished fabric, notwithstanding the poorer stock in such material.

I claim—

1. In a planetary cloth-napping machine, in combination, a napping-drum, a cloth-feed roll, means for operating the same, a series of napping-rolls mounted upon the drum and containing points inclined in the direction in which they act upon the cloth, mechanism whereby the same are driven, crimper-rolls containing substantially straight points mounted upon said drum and interposed in said series, mechanism whereby said crimper-rolls are driven, a tension-roll arranged to act on the cloth in advance of the napping action, means whereby said tension-roll is positively driven and means whereby the speed of said tension-roll may be adjusted independently of the speed of the feed-rolls while the machine is running, substantially as described.

2. In a planetary napping-machine, in combination, a napping-drum, a plurality of series of nap-treating members mounted upon said drum, mechanism whereby a differential action is produced between the members of one series and the members of another series, a cloth-feed roll, a tension-roll acting upon the cloth as it advances toward the napping-cylinder, means for positively driving said tension-roll and means whereby the speed of the same is adjustable during the running of the machine and independently of the speed of the feed-rolls, substantially as described.

3. In a planetary napping-machine, in combination, a drum carrying alternately-arranged rolls operating differentially and having respectively inclined and straight points, a train of mechanism whereby said inclined-pointed rolls are driven, a means of speed adjustment therein, an independent train of mechanism whereby said straight-pointed rolls are driven from the drum-shaft, cloth-feed rolls, feed-roll-operating mechanism, a cloth-tension roll, mechanism whereby said

tension-roll is driven, and a means of adjustment whereby the speed of said tension-roll may be varied independently of the speed of the feed-rolls while the machine is running, substantially as described.

4. In a planetary napping-machine, in combination, a drum carrying alternately-arranged rolls operating differentially and having respectively inclined and straight points, a train of mechanism whereby said inclined-pointed rolls are driven, a means of speed adjustment therein, an independent train of mechanism whereby said straight-pointed rolls are driven from the drum-shaft, cloth-feed rolls, and feed-roll-operating mechanism branching from said last-named train whereby the feed-rolls are driven to feed the cloth in opposition to the rotation of the drum, a tension-roll acting upon the cloth as it advances toward the napping-cylinder, means for positively driving said tension-roll and means whereby the speed of the same is adjustable during the running of the machine and independently of the speed of the feed-rolls, substantially as described.

5. In a planetary cloth-napping machine, in combination, a series of napping-rolls, mechanism whereby the same are driven, mechanism for adjusting the speed of the same, crimper-rolls interposed in said series, the main shaft, a cloth-feed roll, an actuator common to said crimper-rolls and said cloth-feed roll and mechanism whereby said common actuator is driven from said main shaft, substantially as described.

6. In a planetary cloth-napping machine, in combination, a series of napping-rolls, mechanism whereby the same are driven, mechanism for adjusting the speed of the same, crimper-rolls interposed in said series, the main shaft, a cloth-feed roll, an actuator common to said crimper-rolls and said cloth-feed roll, mechanism whereby said common actuator is driven from said main shaft and mechanism for adjusting the speed of said common actuator, substantially as described.

7. In a planetary napping-machine, in combination, a drum carrying alternately-arranged rolls operating differentially and having respectively inclined and straight points, a train of mechanism whereby said inclined-pointed rolls are driven, a means of speed adjustment therein, an independent train of mechanism whereby said straight-pointed rolls are driven from the drum-shaft, cloth-feed rolls, and a feed-roll-operating mechanism branching from said last-named train, substantially as described.

8. In a planetary napping-machine, in combination, a drum carrying alternately-arranged rolls having respectively, substantially straight and inclined points, a train of mechanism whereby said inclined-pointed rolls are driven, a means of speed adjustment therein, an independent train of mechanism whereby said straight-pointed rolls are driven from the drum-shaft, cloth-feed rolls, and a

feed-roll-operating mechanism branching from said last-named train, substantially as described.

9. In a planetary cloth-napping machine,
5 in combination, a drum carrying alternately-
arranged rolls, having, respectively, inclined
and straight points; a train of mechanism
whereby said inclined-pointed rolls are
driven; means of speed adjustment therein;
10 the main shaft; a cloth-feed roll; an actuator
common to said cloth-feed roll and said

straight-pointed rolls, and mechanism whereby said common actuator is driven; substantially as described.

Signed at Worcester, in the county of 15
Worcester and State of Massachusetts, this
21st day of March, A. D. 1898.

DAVID GESSNER.

Witnesses:

A. H. WAITE,
G. K. RAND.