

No. 643,248.

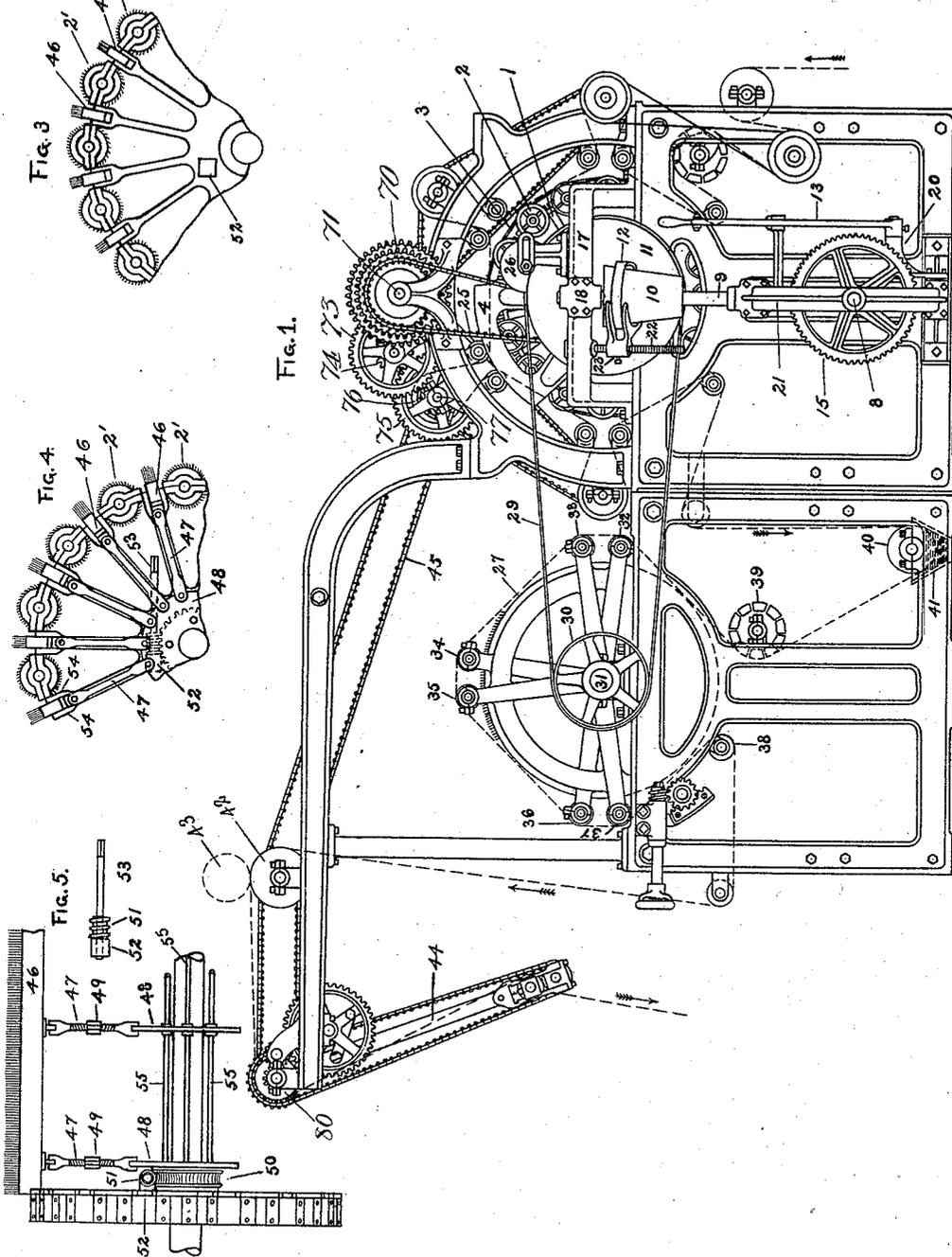
Patented Feb. 13, 1900.

D. GESSNER.
NAPPING MACHINE.

(Application filed Dec. 11, 1894.)

4 Sheets—Sheet 1.

(No Model.)



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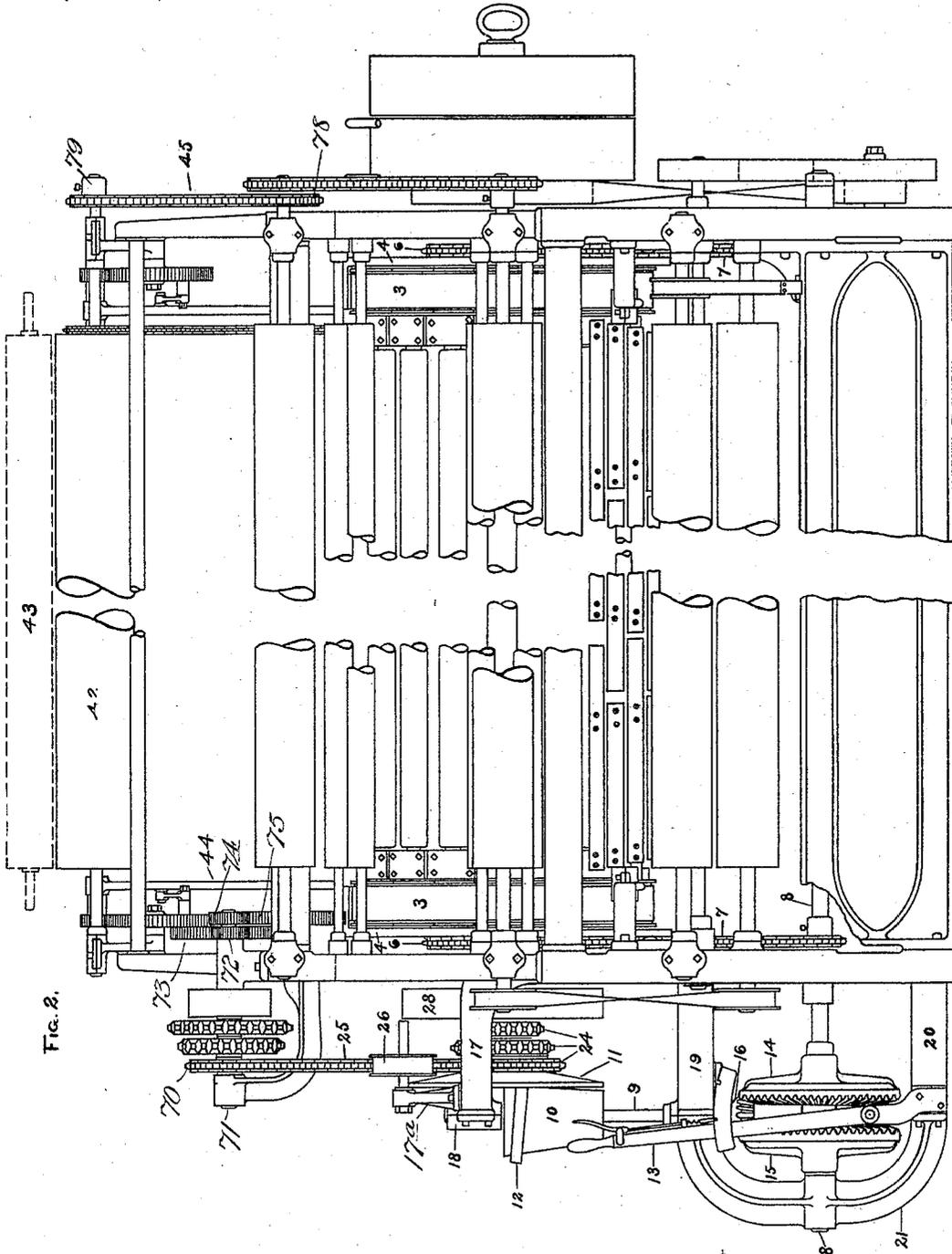


Fig. 2.

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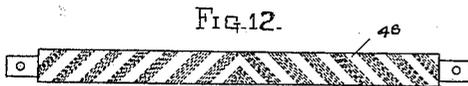
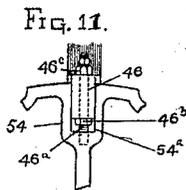
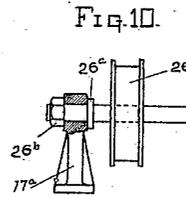
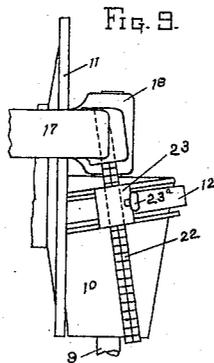
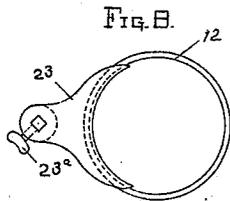
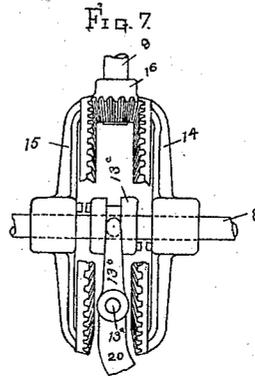
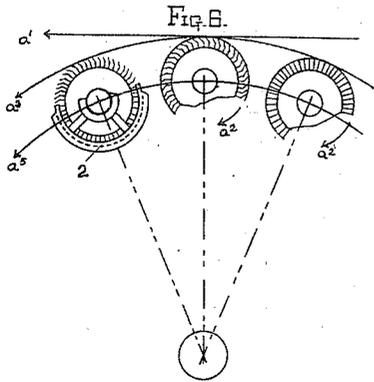
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(No Model.)

4 Sheets—Sheet 3.



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FIG. 14.

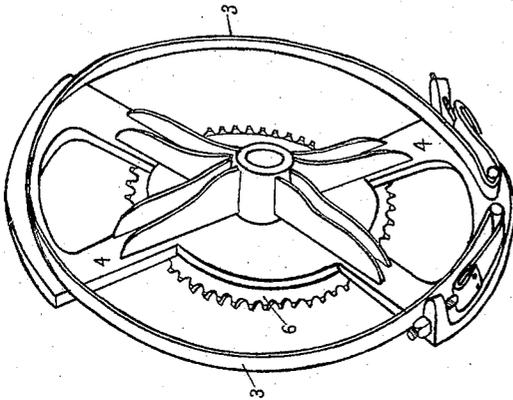


FIG. 15.

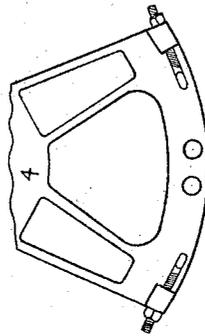


FIG. 16.

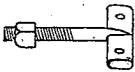
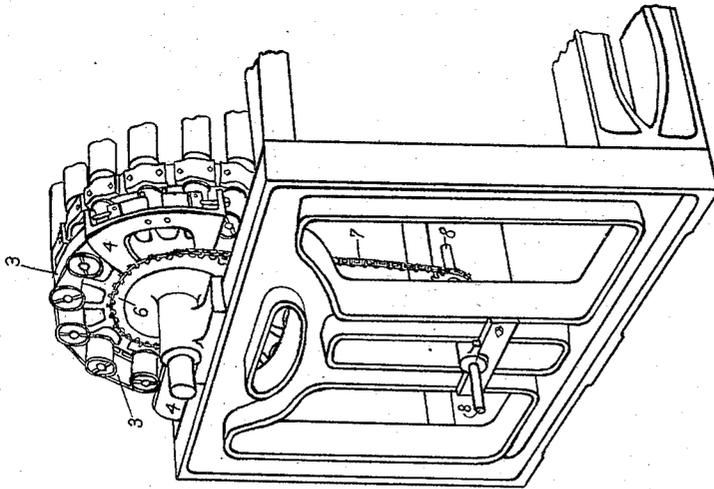


FIG. 13.



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NAPPING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 643,248, dated February 13, 1900.

Application filed December 11, 1894. Serial No. 531,444. (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, Figure 1 is an end view of the machine. Fig. 2 is a front view of the same with certain parts broken away, and Fig. 3 is a detail showing a portion of the cross-section of a napping-cylinder. Figs. 4 and 5 are also details. Fig. 6 is a diagram illustrating the directions of movement of various parts. Fig. 7 is a detail of the clutch. Fig. 8 is a detail of the belt-guide 23. Fig. 9 is a detail of the means of supporting and adjusting the same. Fig. 10 is a detail of the chain-tightener; Fig. 11, the sliding adjustment of the brush-lag 46. Fig. 12 is a detail showing the fish-bone formation of the bristles on the lag 46. Figs. 13, 14, 15, and 16 show in detail the connections between the shaft 8 and the napping-cylinder.

1 is a napping-cylinder, which contains at its periphery a series of napping-rollers 2', driven by contact between the pulleys 2 and the belt 3, which belt is carried by the arm 4, all substantially as shown and described in Letters Patent No. 462,697, granted to me November 10, 1891. Said arm 4 is driven by the sprocket-wheels 6 6, driven by the chains 7 7 from sprocket-wheels on the counter-shaft 8, which shaft is actuated by a vertical shaft 9, carrying a conical roller 10, coöperating with the disk 11 on the shaft of the napping-cylinder through the endless belt 12.

In this machine there are three motions, the resultant of which determines the scratching motion of the wires on the cloth. By "scratching motion" I mean the relative motion between the cloth, traveling forward, and the wires, which scratch the cloth by traveling forward at greater speed than the cloth. Referring to Fig. 6, these three motions are the feed a^1 of the cloth forward, the forward orbital movement a^5 of the napping-rollers around the main shaft, and the rotation a^2 of each roller on its own axis, which in this machine is always backward. Supposing motions a^1 and a^2 to be constant, then variations in the

scratching motion will be produced by varying motion a^2 . Gradual adjustment of this motion a^2 has been accomplished by such devices as the conical roller 10 and disk 11 above referred to; but so far as I know no one has heretofore conceived a mode of operation wherein in addition to adjustment the napping operation may be abruptly stopped or started while the machine is in operation. That mode of operation and one way of accomplishing it constitute parts of my invention.

The napping is due to the scratching motion above referred to in a forward direction—viz., in the direction in which the wires point—and that scratching motion is a relative motion between the wires, which are moving forward, and the cloth, which is also moving forward. Therefore the condition of no napping is produced when the scratching motion is reduced to zero—viz., when the wires and cloth move forward at the same speed—or when the scratching motion is reversed—viz., when the cloth moves forward faster than the wires. This abrupt transition from the napping condition, where the wires move forward faster than the cloth, to the non-napping condition, where the cloth moves forward as fast as or faster than the wires, is accomplished by abruptly accelerating the backward motion a^2 of the napping-rollers on their axes. By the particular means below described for producing such abrupt acceleration the acceleration is carried to such degree as not merely to neutralize the forward scratching movement, which is all that is necessary, but to produce a backward scratching movement.

The particular machine herein described when in napping operation, as one peculiarity of its operation, moves the belt 3 in the direction a^3 , Fig. 6. Therefore the belt moves forward, as do the cloth-feed and the main shaft. Thus, even when napping, the backward rotation a^2 of the rollers on their axes is produced as the resultant of moving the belt 3 forward more slowly than the orbital movement a^5 of the rollers. By reason of this construction I am enabled to accelerate the backward rotation of the rollers on their axes by retarding the forward movement of the belt. The first movement to do this is shift-

ing the connections so that the belt is no longer driven forward. Nevertheless if this motion were alone present the momentum of the parts would tend to carry them forward, so that
 5 the transition from napping to no napping would depend upon their running down. Therefore in the particular machine described I supplement this motion by further shifting the connections, so that this momentum is opposed. In so doing, in the particular form described, the momentum is not only
 10 destroyed, as would be the case if belt 3 were brought to rest, but the belt 3 is positively reversed, so that the motion a^3 is directly the reverse of that shown in Fig. 6.

I will now proceed to describe more particularly the form of construction shown in the accompanying drawings.

I introduce in the connections above referred to a reverser between the conical roller 10 and the arm 4. This reverser I have shown as placed in the connection between the vertical shaft 9 and the counter-shaft 8 and as consisting of an ordinary clutch splined to
 25 the shaft 8 and shifted by the lever 13, which clutch may throw the shaft 8 into operative engagement with either the beveled gear 14 or the beveled gear 15, both of which run loose on the shaft 8 and are driven in opposite directions by the beveled gear 16, fast on the vertical shaft 9. This clutch arrangement is shown in Fig. 7. 13^a is the rocker-shaft, to which the lever 13 is fixed. 13^b is the clutch-fork, also fixed to this rocker-shaft.
 35 13^c is the clutch itself. By means of this clutch the connections may be reversed either while the machine is in operation or at rest. In whichever position the lever 13 stands the napping-rollers will be driven backward upon their own axes, as indicated by arrows a^2 in Fig. 6. The effect of shifting the lever therefore does not change the direction of rotation of the napping-rollers upon their individual axes. When the napping process is
 45 going on, the effect of the napping-points is produced by the fact that the backward motion of each napping-roller on its individual axis is not sufficiently speedy to carry the points in contact with the cloth backward as fast as they are carried forward by the circumferential speed of the total napping-cylinder. The effect of shifting the lever 13 is to accelerate the backward speed of each individual roller until the points in contact with
 50 the cloth are carried backward fast enough so that the resultant of such backward axial rotation and of the orbital movement forward is less than the forward travel of the cloth. When the lever 13 stands in the position for
 60 napping, the shifting of the belt 12 toward and from the center of the disk 11 will vary the degree of napping; but no matter what the position of this belt 12 or of the degree of napping which is in progress shifting the lever 13 will cause it to be discontinued. When
 65 the belt around the napping-rolls is moving slowly forward in the same direction as the

whole cylinder, (as is actually the case when napping,) the rolls turn backward. If the forward speed of the belt is increased, the backward speed of the rolls must slacken, because
 70 the cylinder goes forward too, and hence they nap more the faster the belt goes forward. Now if I reverse the lever the belt goes backward or in the opposite direction to that in
 75 which the whole cylinder goes, and hence the backward motion of the rolls is increased, so that they cannot nap at all, because the napping-points run away from the cloth. Thus the reversing of the belt does not change the
 80 direction in which the rolls run. It merely increases their backward speed, which, however, is always a backward one, no matter which way the belt runs. So long as it (the belt) runs forward with the cylinder the rolls
 85 nap much or little, according to the degree of forward speed one chooses to give the belt; but the moment the belt is reversed it causes the napping-rolls to run backward so fast, no matter what the position of the endless strap
 90 between cone and disk, that all napping stops. The mode of operation whereby I am thus enabled to stop the napping process instantaneously is accomplished without necessitating any change in the feed and is of the utmost importance, because it enables the operator to watch a piece of cloth passing
 95 through the machine until the napping process has come close up to a seam and then to immediately stop the napping. Thus he is enabled to nap the cloth all the way up to the seam, but to protect the cloth that follows behind the seam from any napping operation. This protection is useful where two
 100 different weights or varieties of cloth are sewed together, and it is also useful in protecting so-called "leaders" from being napped to pieces. This mode of operation is, moreover, very useful in the case of accident where a piece of cloth is caught by the nappers at the mouth of the machine and has begun to wind around the napping-cylinder. By the reversing mechanism above described this winding of the cloth can be stopped as soon as it starts by an observing attendant.
 115 This mode of operation is also useful in enabling the attendant to straighten out a badly folded piece of cloth as it comes to the machine, because he can feed it through the machine with all the conditions the same as
 120 when napping, excepting without the operation of the napping; and is thereby enabled to straighten it out as it goes through, so that as it passes through the second time it will be in proper alinement, and he can then start
 125 the napping operation successfully.

My present machine also contains the following: The upright shaft 9 has a bearing at its upper end against the yoke 17, which is secured to the main frame. It is held to this
 130 bearing by the cap 18, bolted to the face of the yoke. Below it is supported against the end of a stand 19, secured to the main frame. The bearings for the shaft 9 are therefore

close together, and the roller 10 is between them, so that spring is prevented. The stand 20 constitutes the fulcrum for the lever 13.

21 is a yoke connecting the stands 19 and 20 and carrying at its middle the bearing for the outer end of the counter-shaft 8. This yoke may constitute the cap to the bearing of the shaft 9 against the stand 19. Thus by removing the cap 18 and the yoke 21 the vertical shaft 9, with the parts carried by it, may be removed, and also the gears 14 and 15, and the clutch between them may be slid off of the counter-shaft 8. The graduated guide-bar 22 for the supporter 23 of the endless belt 12 is connected with the yoke 17, from which it extends downward, so that the support 23 may be removed downward without dismantling the yoke 17. The position of the support 23 on the guide-bar 22 is fixed by the set-screw 23^a.

The feed mechanism is actuated from one of the three sprocket-wheels 24 on the main shaft through the sprocket-chain 25, and the adjustable chain-tightener 26 is mounted on bracket 17^a on the yoke 17, as shown. It is made adjustable on said bracket by means of a slotted bearing therein, its position in said bearing being fixed by clamping said bracket between the collar 26^a and the nut 26^b. The sprocket-chain 25 drives the sprocket-wheel 70, fast on shaft 71, to which is fixed the pinion 72, which drives the gear-wheel 73, to which is fixed a pinion 74, which drives a gear-wheel 75, fixed to shaft 77 of the feed-roll 76. On the opposite end of said shaft 77 is fixed a sprocket-wheel 78, which drives a sprocket-chain 45, which drives the sprocket-wheel 79, fixed to the shaft of the burnishing or ironing roll 42. It will be seen that the diameters of the feed-roll 76 and the sprocket-wheels 78 and 79 and the roll 42 are such that the roll 42 will be driven forward with greater circumferential speed than the feed-rolls, thus burnishing in a forward direction, being the same direction as that in which the nap is laid. The sprocket-chain 8 drives the other feed-rolls from the shaft 77.

27 is a brushing-cylinder for laying the nap. It is of substantially the same diameter as the napping-cylinder 1. It is driven from the pulley 28 on the shaft of the napping-cylinder by the open belt 29 and pulley 30, fixed upon its shaft 31. Therefore the brushing-cylinder will be turned in such direction that the brush-points act upon the fibers of the nap in the same direction as that in which the napping-points act, being also the direction in which the cloth travels.

32, 33, 34, 35, 36, 37, and 38 are rollers suitably mounted for guiding the cloth into contact with the brushing-cylinder.

39 is a stretcher.

40 is a roller the lower half of which is immersed in water in the trough 41. The course of the cloth through the machine is represented in broken lines, and after leaving the napping-cylinder it will be seen that it passes

around the roller 40, by which it is wet, and thence to the brushing-cylinder, by which the nap is laid while wet.

42 is a draft-roller that may be heated.

43 is a roll resting on the top of the cloth.

44 is a folder. The roll 42 and the folder 44 are driven by the sprocket-chain 45.

In Fig. 3 I have shown the form in which I prefer to construct the napping-cylinder. Between each of the two napping-rollers 2' I arrange brush-lags 46. Each of these brush-lags extends the full width of the cylinder parallel with its axis. Each is detachably fastened at the ends to the head-frames of the cylinder by adjustable connections and may be supported between the two heads at suitable intervals. Such an adjustable connection is shown in Fig. 11. It is constructed as follows: The head-frame of the cylinder 54 is provided with a slotted bearing 54^a for the end of the lag 46. A screw-threaded bolt 46^a is fixed at the bottom of the slot and extends outwardly therefrom through a hole in the bearing of the lag 46. Set-nuts 46^b and 46^c are placed on this bolt above and below said bearing.

In Fig. 4 the brush-lags 46, instead of being fastened merely to the head-frames of the cylinder, which would make them stationary, are made to slide radially between guides cast to the head of the cylinder and underneath are shackled through connecting pieces or arms 47 to a head 48, movable upon the cylinder-shaft. There is a series of these heads 48 upon the cylinder-shaft between the head-frames carrying the napping-rollers. On one end to one of the heads 48 is fastened a worm-wheel 50, engaging with a worm 51, which turns on a bracket 52, cast to one of the cylinder-head frames. By turning this worm 51 the head 48 will be caused to revolve upon the cylinder-shaft, and as this head is connected by tie-rods 55 with the remaining series of heads 48 they all move in unison. The arms 47 are made adjustable lengthwise by turning a nut 49, so that the lag 46 may be adjusted exactly parallel with the axis of the cylinder, and thus be made to line with the napping-rolls. Now it will be seen that by placing a wrench on the square end 53 the worm 51 can be made to slide the brush-lags 46 between the cylinder-heads radially into more or less contact with the cloth as it passes around the napping-cylinder. As the object of the brushes is to lay the nap which has been raised by the napping-rolls 2', the amount of brushing or laying of the nap can thus be regulated at will. The brushes can thus be made to lay as heavy or as light against the cloth as may be desired, and if moved out radially away from the center a sufficient length beyond the circle described by the napping-rolls the brushes 46 will lift the cloth, so that the napping-rolls 2' can act but very little or not at all. On the other hand, if the brush-lags are contracted toward the center below the circle described by the napping-rolls they

will cease to brush entirely and the napping-rolls 2' only can act. With the cylinder thus arranged the cloth may be napped only, or napped and brushed, or may be brushed only, as the operator sees fit. The bristles of the brushes may be arranged on the lags 46 in fish-bone formation, if desired, so as to tend to spread the cloth at the same time that they brush it and lay the nap. Such fish-bone formation is shown in Fig. 12.

I do not wish to confine myself to the construction shown for moving in and out the brushes 46, because any one skilled in the art could take some other means to accomplish the same object. The napping-rollers have the function of raising the nap analogous to the raising action of teasles; but they lack the function of laying the nap analogous to the laying action of non-rotary teasles. This laying function is performed in my machine by the brushes, and I do not wish to be understood as limiting myself to the material or form of the points of the brushes. So long as, in contradistinction to the raising action of the napping-rollers, such points are of a form and material adapted to produce the laying action above referred to I regard it as a brushing action. The combination of the napping-rolls and adjustable brushes is such that the operator can nap and brush at the same time or do either alone and regulate this process to a nicety, thus doing in one operation what heretofore required two. Of course the brushing-cylinder 27 in Fig. 1 adds very much to the laying process; but there are many goods that can be napped and laid satisfactorily without resorting to the additional brush-cylinder 27, thus saving room and expense.

What I claim is—

1. In a napping-machine, in combination, the napping-cylinder, the napping-rollers, a rotating member for driving the same, the cloth-feeding rollers, mechanism whereby said cylinder, feeding-rollers and rotating member are all driven forward; said mechanism being proportioned and arranged substantially as described, so that the speed of forward motion of said rotating member is intermediate the forward speed of the cloth and cylinder; the mechanism for driving said rotating member being provided with mechanism whereby the speed of said rotating member may be adjusted and separate mechanism whereby the forward movement of said rotating member may be arrested, substantially as described.

2. In a napping-machine, in combination, the napping-cylinder, the napping-rollers, connections whereby the napping-rollers are driven; said connections containing two mechanisms whereby the motions of said napping-rollers are controlled, viz: mechanism whereby the speed of the napping-rollers may be adjusted for different degrees of napping and an independent mechanism whereby said

napping-rollers may be speeded backward to arrest the napping, substantially as described.

3. In a napping-machine, in combination, the napping-cylinder, the napping-rollers, a member whereby the napping-rollers are driven upon their axes, connections whereby said member is driven by the rotation of the cylinder, means of adjustment in said connections whereby the speed of said member may be controlled and other means independent of said adjustment whereby the movement of said member in its normal direction may be arrested, substantially as described.

4. In a napping-machine, in combination, the napping-cylinder, the napping-rollers, a member whereby the napping-rollers are driven upon their axes, connections whereby said member is driven by the rotation of the cylinder, means of adjustment in said connections whereby the speed of said member may be controlled and other means independent of said adjustment whereby the movement of said member in its normal direction may be arrested and reversed, substantially as described.

5. In a napping-machine, in combination, the napping-cylinder, the napping-rollers, a member whereby the napping-rollers are driven upon their axes, connections whereby said member is driven by the rotation of the napping-cylinder; said connections containing a driving member and a driven member, and means whereby said driving and driven members may be disconnected from each other, and means whereby said driven member is arrested, substantially as described.

6. In a napping-machine, in combination, the napping-cylinder, the napping-rollers, a member whereby the napping-rollers are driven upon their axes, connections whereby said member is driven by the rotation of the napping-cylinder; said connections containing a driving member and a driven member and a clutch whereby the momentum of said driven member is arrested, substantially as described.

7. In a napping-machine, in combination, the napping-cylinder, the napping-rollers, a member whereby said napping-rollers are driven upon their axes, connections whereby said member is driven by the movement of the napping-cylinder; said connections containing mechanism whereby the degree of the napping action may be adjusted and independent mechanism whereby said napping operation may be arrested without substantially varying the said adjustment, substantially as described.

8. In a napping-machine, in combination, the napping-cylinder, the napping-rollers, a member whereby the napping-rollers are driven upon their axes, connections whereby said member is driven by the rotation of the napping-cylinder; said connections contain-

ing a driving member and a driven member, means whereby said driving and driven members may be disconnected from each other and mechanism whereby the degree of napping may be adjusted, substantially as described.

9. In a napping-machine, a cylinder having the napping-rollers and brushes arranged intermediate the same, substantially as described.

10. In a napping-machine in combination with the napping - cylinder, the following mechanism whereby the napping-rollers are controlled, viz: the disk 11, the conical roller 10, the belt 12, the shafts 8 and 9, the disconnecting mechanism interposed between the two and mechanism whereby the motion of said shaft 8 is communicated to said napping-rollers, substantially as described.

11. In a napping-machine in combination with the napping - cylinder, the following mechanism whereby the napping-rollers are controlled, viz: the disk 11, a rotating device cooperating with the same, means for shifting said rotating device to and from the center of said disk, the shaft 9 upon which said rotating device is mounted, the shaft 8, a disconnecting mechanism interposed between said shafts and mechanism whereby the motion of said shaft 8 is communicated to said napping-rollers, substantially as described.

12. In a napping-machine, in combination the napping-cylinder shaft, a disk 11 mounted thereon, a rotating device cooperating with said disk, means for moving said rotating device to and from the center of the disk, the shaft upon which said rotating device is mounted, a cap 18 secured to the outside of the frame by the removal of which the shaft bearing said rotating device may be removed

independently of the other operative parts, substantially as described.

13. In a napping-machine, in combination, the shaft 9, means whereby motion is communicated to said shaft from the napping-cylinder shaft, the shaft 8, means whereby motion is communicated therefrom to the napping-rollers, the beveled gears 14 and 15, the clutch interposed between the same and the yoke 21 removably attached to the frame on which yoke 21 the outer bearings of the shaft 8 are mounted, substantially as described.

14. In a cloth-napping machine, in combination, the disk 11, the conical roller 10, the belt 12 interposed between the face of said disk and the periphery of said conical roller, the belt-supporter 23, the yoke 17 and the guide-bar 22 depending from said yoke and upon which bar said belt-supporter 23 is longitudinally adjustable to support said belt in contact with any desired part of said conical roller, substantially as described.

15. In a napping-machine, a napping-machine cylinder, containing in combination, the napping-rolls, the brushes, and means whereby the relative position of said rolls and said brushes may be adjusted to nap and brush simultaneously or separately, substantially as described.

16. In a napping-machine, a napping-machine cylinder containing in combination, napping - rolls, radial guides, brush - lags mounted in said radial guides, and means whereby the same may be adjusted radially, substantially as described.

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