

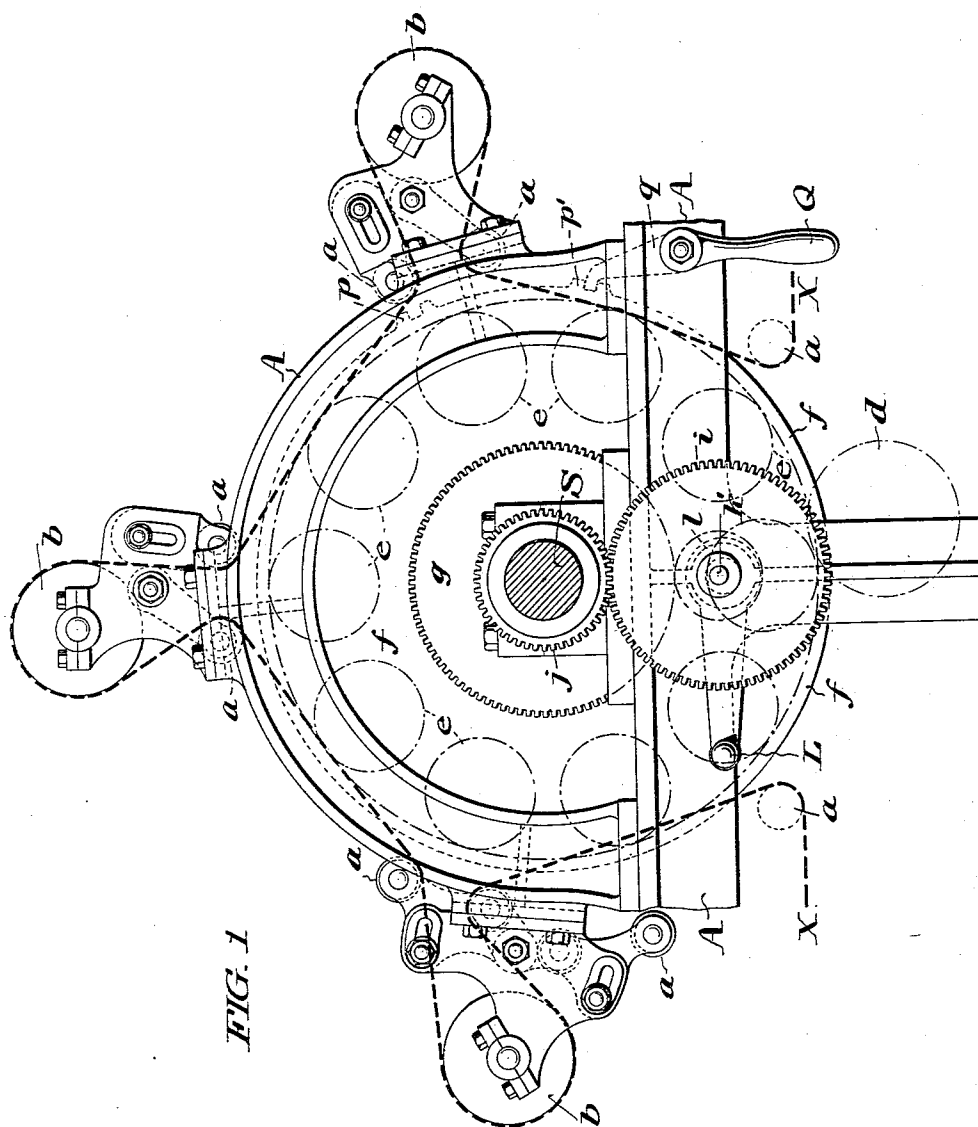
(No Model.)

3 Sheets—Sheet 1.

L. CLARENBACH, Jr.  
COMPOUND NAPPING MACHINE.

No. 559,997.

Patented May 12, 1896.



WITNESSES:

*Edwin J. Austin*  
*Randolph J. J. J.*

INVENTOR:

*Louis Clarenbach, Jr.*  
*by his Atty*  
*Henry H. Paul Jr.*

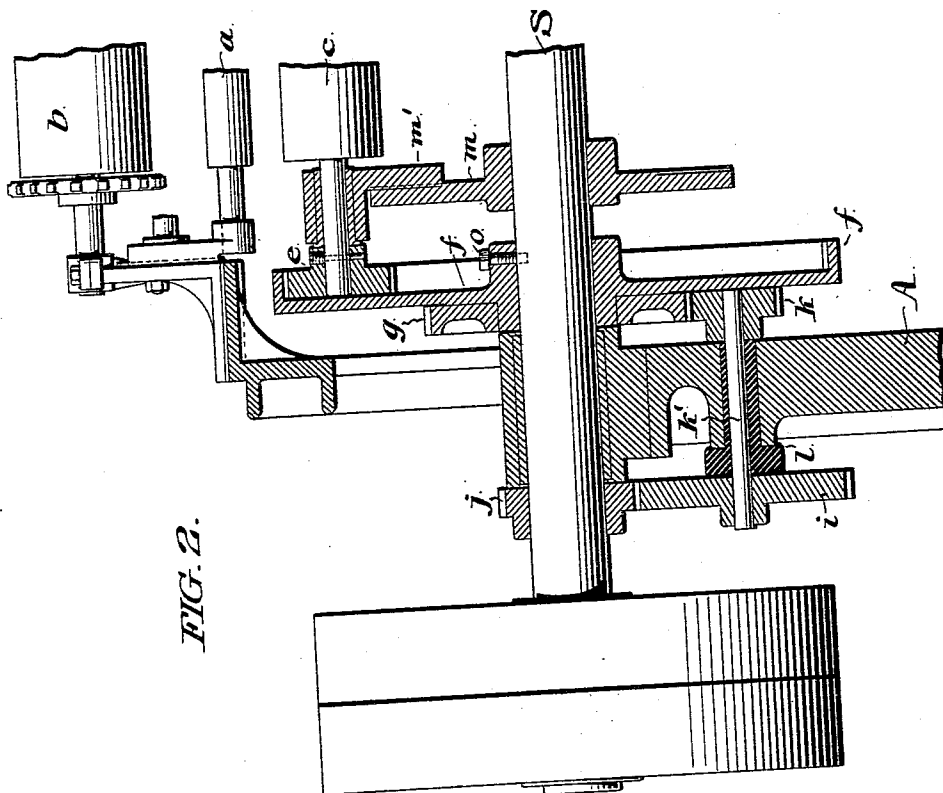
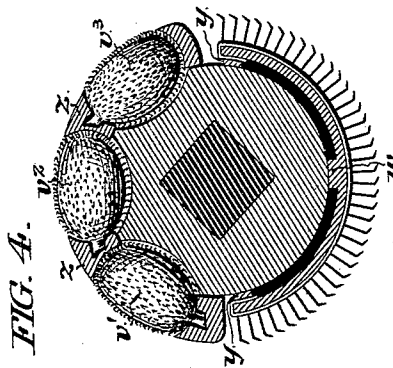
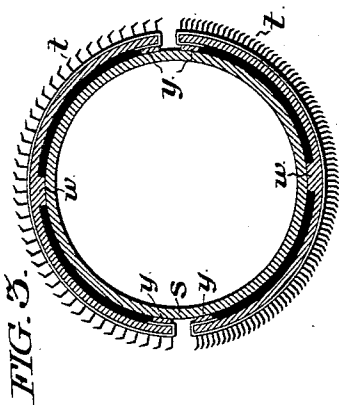
(No Model.)

3 Sheets—Sheet 2.

L. CLARENBACH, Jr.  
COMPOUND NAPPING MACHINE.

No. 559,997.

Patented May 12, 1896.



WITNESSES:

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(No Model.)

3 Sheets—Sheet 3.

L. CLARENBACH, Jr.  
COMPOUND NAPPING MACHINE.

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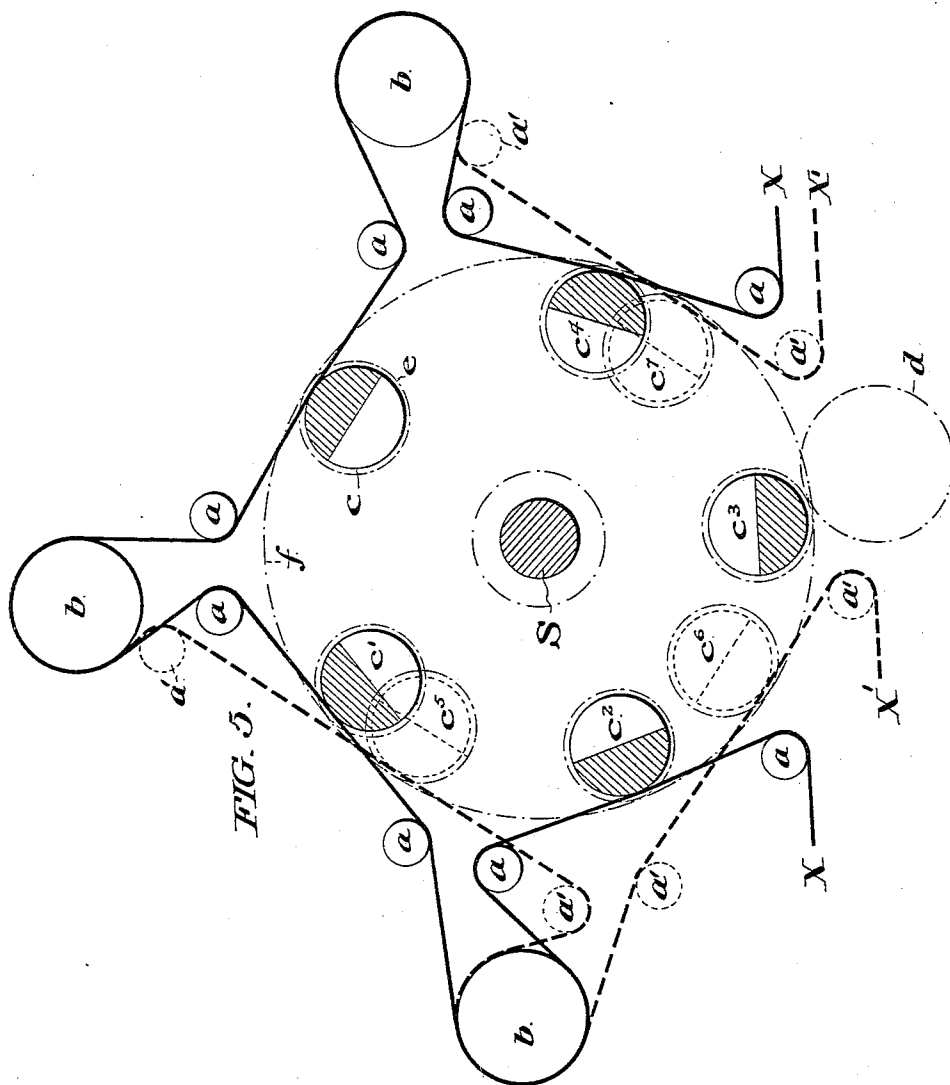


FIG. 5.

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# UNITED STATES PATENT OFFICE.

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HANNAH M. HASENCLEVER, OF JERSEY CITY, NEW JERSEY.

## COMPOUND NAPPING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 559,997, dated May 12, 1896.

Application filed December 21, 1895. Serial No. 572,846. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS CLARENBACH, JR., of Philadelphia, Pennsylvania, have invented a certain new and useful Compound Napping-Machine, of which the following is a specification, reference being had to the accompanying drawings.

Figure 1 is an end elevation of my machine, a part of the standards or supports being broken away and certain of the concealed portions being indicated by dotted lines. Fig. 2 is a sectional elevation of one end of the same, showing the ends of the main shaft and certain of the rollers in elevation and the remainder of the parts in a central vertical section. Figs. 3 and 4 are cross-sections indicating the details of the construction of the rollers adapted to be used in my machine. Fig. 5 is a diagram indicating certain variations in the adjustment of the cloth.

My invention has for its object to produce a machine of the general type of the planetary or epicycloidal napping-machine, in which two or more sorts of napping may be performed, not only with the same drum or cylinder, but with one and the same set of rollers.

When I speak throughout this specification and claims of the operation of "napping" or of "napping material," I mean to include all operations and materials, natural or artificial, which are capable of raising a nap on textile fabrics. The best known of these materials are teazels and wire-cloth, and of each of these a great many grades of fineness are known. All different sorts of material, however, which are capable, when mounted on a revolving drum, of raising a nap are within the scope of my invention, and when I speak of different sorts of "napping" I mean napping varying in the degree of action on the fabric and performed by any of the materials referred to. Furthermore, although brushing with bristle brushes is usually employed, not to raise a nap, but to lay or direct the trend of a nap already raised, yet it, too, is within the scope of my invention, and when I speak of the operation of "napping" I wish to be understood to include such brushing operation. These various operations have hitherto been performed by separate drums, generally

mounted on two separate machines. In some cases it has been proposed to perform these operations upon the same drum, but with different sets of rollers. My invention, however, contemplates the performance of two or more of these operations with the same set of rollers. This result is accomplished, generally speaking, by so mounting each of the rollers upon the drum that for any given operation the operative portion of the roller—that is to say, that portion to which the cloth is tangential at the points of contact—is always confined to one more or less limited longitudinal section of the cylindrical surface of the roller. By dividing the surface of each roller into two or more of these longitudinal sections and fitting each of these sections with napping material of a different sort it is only necessary in order to accomplish the ends of my invention to provide means whereby during one part of the operation of the machine all of the rollers shall present for work sections fitted with material of one character, while during a successive part of the operation they shall all present sections fitted with material of a different character. I have invented means which successfully accomplish this end and have shown and am about to describe a form of machine which I consider to be best adapted for this purpose; but I believe that no one has heretofore conceived the idea of dividing the surfaces of the rollers into portions fitted with materials or clothing of a varying character and regulating the character of the work to be performed by the rollers according to the portion which is presented for work at a given time. Consequently I wish it to be understood that the scope of my invention is not limited to the particular means by which the actuation of the rollers, so as to accomplish this result, is performed.

In Figs. 1 and 2 A A is a portion of the standard of the machine, the sides and bottom being broken away. *m* is one of the two spider-frames which make up the drum, around the periphery of which the rollers are mounted. *m'* shows one of the adjustable bearings in which these rollers are mounted. *c c* are the rollers, which may vary in number. The axes of these rollers project through their bearings, and each of them carries upon its

exterior extremity a spur-wheel *e*. Upon the shaft *S*, but rotating independently thereof, is mounted, between the drum and the bearing of the shaft, the large wheel *f*, having an inwardly-projecting peripheral flange, upon the internal perimeter of which is formed an internal gear, which engages with each one of the spur-wheels mounted upon the extremities of the rollers. This wheel *f* has formed upon its outer side a smaller pinion *g*, engaging with a pinion *k*, mounted upon a small counter-shaft *k'*, the other extremity of which carries a pinion *i*, which engages with the pinion *j*, mounted upon the shaft *S*. The small counter-shaft *k'*, which has been referred to, is eccentrically journaled within a collar *l*, which is in turn mounted in the standard *A*. This collar is capable of rotation by the handle *L*, and according to its position will the train of gearing which has just been described be either operative or inoperative. The wheel *f* is furnished with a set-screw *o*, or any similar device, whereby it may, when desired, be locked to the shaft *S* and caused to rotate with it. It is furthermore furnished upon its periphery with two or more stop-holes *p p'*, into which fits the extremity of the detent-lever *q*, which is pivoted upon the standard *A* and operated by the handle *Q*. Upon the standards *A* are mounted the usual cloth guiding and drawing rollers *b*. *d* represents the brushing-roller, by which the rollers upon the drum are cleaned. *a a a*, &c., are adjusting-rollers, all of which are so mounted between the ends of the standards that they are capable of a very considerable degree of circumferential as well as radial adjustment with reference to the drum. This adjustment is obtained either by mounting the rollers upon swinging levers, which are capable of being fixed at any desired point, or by having extra sets of bearings properly placed, to which the rollers may be removed when it becomes necessary. Both these means are illustrated in the drawings, but they are capable of great variations and are shown with sufficient clearness in Fig. 1 to require no further description.

Fig. 3 shows in section one of the rollers *c* as constructed to carry out the purposes of my invention. It consists of a central metallic core *s* and two longitudinal peripheral sections *t t*, which are here shown as equal semicircular sections. The number, however, of these sections may be increased, the size of their arc being proportionally diminished. Each of these sections is furnished on its outer surface with napping material of a different character, the upper one in Fig. 3 being a coarse wire napping-clothing and the lower a finer wire napping-clothing. The ends of the clothing are turned in under the edges of the sections and secured by strips *y y*, fastened by screws running through the clothing into the sections. To prevent these sections from losing their shape under pressure, one or more longitudinal ribs *w w* may

be formed on the interior of the sections to rest against the central core.

Fig. 4 illustrates a roller of the same construction, as far as its lower half is concerned, but its upper half is provided with longitudinal slats *z z*, with suitable indentations for holding between themselves teazels. In this case three lines of teazels *v' v<sup>2</sup> v<sup>3</sup>* are thus secured to the roller, and each line may preferably be composed of teazels of a different quality. The peripheral sections and the teazel-slats may be secured to the central core in any convenient way; but I prefer the use of collars at the extremities of the rollers with inwardly-overhanging flanges by which they may be clamped in place.

The operation of the machine will now be described. For the sake of example it may be supposed that all of the rollers *c* are of the description shown in Fig. 3, and therefore covered one half with coarse-wire clothing and one half with fine-wire clothing. For the first part of the operation it is necessary that only those portions of the rollers which are covered with the coarse clothing shall be presented for action upon the cloth. Let it be supposed that the wheel *f* carries upon its internal gear two hundred teeth and that each of the spur-wheels *e* has forty teeth. If the wheel *f* is stationary while the drum revolves, each roller *c* will make five complete backward revolutions to one forward revolution of the drum, and if at the moment of starting any roller is so situated that the central line of that portion of the periphery which is covered with coarse clothing is outermost it is obvious that at five equidistant points in the course of the revolution of the drum will this same peripheral line be outermost. If, therefore, the cloth which is to be operated upon is so placed by means of adjusting-rollers as to be tangential only to these five points in the course of the revolution of the drum, it will be acted upon only by the single portion of the roller which has been referred to. To perform this operation upon the cloth, therefore, it is necessary to first move the handle *L* so as to throw the gearing by which the wheel *f* may be independently actuated out of play. This wheel is then locked in position by the lever *q* in such position that five out of the ten rollers present outwardly that portion of their periphery which is fitted with the sort of clothing adapted to do the work desired, while the other five intermediate rollers are in precisely the opposite position. The adjusting-rollers are then so adjusted as to carry or present the cloth for contact to the rollers which have been first spoken of and only to them.

Since in most napping-machines the lowermost portion of the drum must be used to drop the fly and waste by means of the cleaning-roller *d*, as a matter of fact but four of the five of the contact-points can usually be taken advantage of; but at these four points, as shown by the heavy broken line *x x*, Fig.

1, the cloth is presented tangentially to the rollers, each of which presents to the point of contact clothing of a given character. The intermediate rollers, it will be observed, which are reversed in position, cannot touch the cloth until they have made a half-revolution. If the machine be now set in motion, it is obvious that all the rollers will touch the cloth at four points in the course of each revolution of the drum, and always in such way as to present for work the portion fitted with the character of clothing desired for the operation—*e. g.*, the coarse-wire clothing shown in the upper half of Fig. 3.

When it is desired to alter the character of the napping to that produced by the finer variety of wire clothing with which the other sides of the rollers are covered, the position of all of the rollers must be changed so as to present for work only the portions of the rollers which are fitted with this fine clothing. To effect this, the wheel *f* is released and advanced until the detent engages with the next stop-hole, which is distant twenty teeth from the first, so that the movement thus effected will have imparted to each roller a half-revolution, thus throwing the opposite side of each roller into action. The tangential points with relation to the circumference of the drum will, however, remain the same, and no change need be made in the adjustment of the cloth. The machine is then again set in motion, and now the rollers present for work only the portions which are fitted with the fine-wire clothing. In the operation thus described but one ratio between the speed of revolution of the drum and that of the rollers is possible. I have, however, provided means whereby, if greater energy of action is desired, the ratio of the revolutions may be changed to produce such result. These means consist in the positive gear by which the wheel *f* may be actuated. To effect this actuation, the detent is released from the wheel *f* and the lever *L* thrown so as to bring the pinions *i* and *k*, respectively, into gear with the pinions *j* and *g*. For the sake of example, let it be assumed that the pinion *j* has forty-eight teeth, the pinion *i* eighty teeth, the pinion *k* thirty-two teeth, and the pinion *g* ninety-six teeth. The result of the train of gearing, as a moment's calculation will show, is that for each five revolutions of the shaft *S* the wheel *f* will have made one revolution in the same direction, or for one revolution of the shaft *S* the wheel *f* will have made one-fifth of a revolution in the same direction. The effect of this is that instead of each roller making five revolutions in the course of one revolution of the drum it will make but four. Consequently instead of five positions in which the desired portion of the roller is presented outwardly for work there will be but four. These positions are indicated diagrammatically in Fig. 5, where *c*, *c'*, *c''*, *c'''*, and *c''''* represent the five positions, with the same given point on the periphery of the roller outward, which are as-

sumed by any one of the rollers in the course of a complete revolution. This given point having been so chosen as to be capable of doing the character of napping required, the cloth must then be so adjusted as to be touched by the rollers only at this point. This adjustment is indicated by the heavy line *xx*, Fig. 5. When the train of gearing is thrown into operation, as has been explained, these positions change to the four which are indicated by *c*, *c'*, *c''*, and *c'''*, Fig. 5, the position *c* at the upper right-hand corner remaining identical. The corresponding adjustment of the cloth is indicated by the broken line *x'x'*. To effect this, the adjusting-rollers *a a a*, &c., are altered from the positions indicated to the positions *a' a' a'*, &c. In making this adjustment the greatest change in position takes place at the lower left-hand corner, and it is in order to make this adjustment that the adjusting-rollers, instead of being simply swung into their new position, are removed and inserted into a new set of bearings. This adjustment having been made, the operation of the machine proceeds as before, except that the napping will be more vigorous, owing to the fact that the backward revolution of the rollers as the drum advances is reduced one-fifth.

Up to this point the operation of the machine has been described entirely with reference to wire-napping. For the purpose of napping by teazels still another adjustment is necessary. For this operation no planetary or epicycloidal motion is necessary. Consequently the rollers *c* must now be fixed in position upon the drum as it revolves. To effect this, the wheel *f* must be disengaged both from its actuating-gear by the lever *L* and from its detent by the lever *Q*, and fixed to the shaft *S*, for which purpose a set-screw is shown in Fig. 2 of the drawings, although any suitable device may be employed for this purpose. The simultaneous revolution of the drum and the wheel *f* is thus secured.

Supposing now that each of the rollers is of the character shown in Fig. 4, in which a portion of the periphery is fitted with teazels, each one of the ten rollers must be so placed that the central line of teazels *v''* is directed outwardly. If only every other one of the rollers are initially in this desired position, the intermediate rollers must be reversed in position, which is facilitated by the screw-pin shown in Fig. 2, by which the pinion *e* is united to the shaft of the roller *c*. By removing this pin and turning the roller half-way around and then reinserting the pin the desired change is accurately accomplished. If now the wheel *f* be clamped in position so as to revolve with the shaft, the entire drum will act as though it were a large roller furnished only with teazels of the variety *v''*. For the purposes of this operation it is plain that no special adjustment of the cloth is necessary, as no matter where the points of contact be the operation of the drum is the

same. If now, in addition to the particular variety of teazels  $v^2$  with which the central compartments of the rollers are fitted, there be two other varieties  $v'$   $v^3$ , it is plain that by a very slight change in the relation of the wheel  $f$  to the shaft either of these varieties may be quickly substituted for the first as those which are outward and therefore in operative position, so that by thus employing teazels of different grade and by varying the succession in which they operate finish of the finest character, to fit any variety of goods, may be obtained.

It must be pointed out that a machine thus constructed is capable of great variety of detail, and that the ratios of revolution which are given and the size and number of peripheral sections and the number of rollers which are shown are mere examples, of which the variation is almost infinite.

By rollers constructed in different ways, and also by varying sets of rollers, a great number of operations may be performed. Thus at present teazel-gigs cannot be dispensed with on so-called "face goods." It is impossible to properly finish, with the most modern wire napper, broadcloth, beaver, doeskin, kersey, and other goods of high finish on one and the same machine. It has required two distinct cylinders or drums for this purpose, one fitted with wire clothing to raise the nap and another fitted with teazels to lay and give luster to the same. By the use of the compound roller shown in Fig. 4 both these operations may be performed, not only by the same machine, but by the same drum and series of rollers, with the additional advantage that three varieties of teazels may successively be brought into play after the wire-napping operation has been performed by those portions of the rollers which have been fitted with wire clothing. Again, for napping cotton or woolen dress goods, cottonades, and similar fabrics, which are napped in a dry state on wire nappers, two or more sets of rollers are now required, each furnished with a different quality of wire clothing to produce a different result. By the use of such a roller as is seen in Fig. 3 two or more grades of napping may be performed with the same set of rollers by means of the very simple adjustments which have been described. Furthermore, in the various brushing operations which have been referred to it is often advisable to use successively two or more varieties of brushes—as, for example, wire brushes and bristle brushes. For this purpose my machine is applicable by using a series of rollers, each fitted one half with wire and one half with bristles. If the machine is now arranged and operated in the manner described when speaking of napping by teazels, both varieties of brushing may be performed successively.

In short, my invention enables the builder to construct a machine that is capable, by a little adjustment, of performing all these op-

erations and in any desired sequence, depending simply upon whether the series of rollers are, for example, half wire and half teazel, or half fine wire and half coarse wire, or half bristle and half wire, as the occasion may require; or if a still more complicated operation be called for three or even more varieties of work may be performed by the same set of rollers, it only being necessary to reduce the size and increase the number of the peripheral sections accordingly.

Having thus described my invention, I claim—

1. The combination of a revolving napping-drum carrying a series of napping-rollers mounted circumferentially upon it, each of said rollers having different longitudinal sections of its periphery furnished with different varieties of napping material; means for guiding cloth into position to be operated upon by said drum at one or more points; and means whereby the said series of napping-rollers are caused to present for work at the said operative points but one given variety of material during any given continuous napping operation, substantially as described.

2. The combination of a revolving napping-drum carrying a series of napping-rollers mounted circumferentially upon it, each of said rollers having different longitudinal sections of its periphery furnished with different varieties of napping material; means for guiding cloth into position to be operated upon by said drum at one or more points; means whereby the said series of napping-rollers are caused to present for work at the said operative points but one given variety of material during any given continuous napping operation, and means whereby the character of the material thus presented at the operative points may be changed when it is desired to pass from one given napping operation to another, substantially as described.

3. The combination of a revolving napping-drum carrying a series of napping-rollers mounted circumferentially upon it, each of said rollers having different longitudinal sections of its periphery furnished with different varieties of napping material; means for guiding cloth into position to be operated upon by said drum at one or more points; spur-wheels upon the extremities of each of said napping-rollers; a single gear-wheel engaging all of said spur-wheels and imparting thereto planetary motion; and means for holding said gear-wheel in two or more positions fixed with reference to the framework of the machine, at each of which positions all of the rollers present for work at the said operative points but one variety of napping material, substantially as described.

4. The combination of a revolving napping-drum carrying a series of napping-rollers mounted circumferentially upon it, each of said rollers having different longitudinal sections of its periphery furnished with different varieties of napping material; means for guid-

ing cloth into position to be operated upon by said drum at one or more points; spur-wheels on the extremities of each of said napping-rollers; a single gear-wheel engaging all of said spur-wheels; and means for holding said gear-wheel in two or more positions fixed with reference to the said revolving drum, at each of which positions all of said napping-rollers present but one variety of napping material outward for action, substantially as described.

5. The combination of a revolving napping-drum carrying a series of napping-rollers mounted circumferentially upon it, each of said rollers having different longitudinal sections of its periphery furnished with different varieties of napping material; means for guiding cloth into position to be operated upon by said drum at one or more points; spur-wheels upon the extremities of each of said napping-

rollers; a gear-wheel engaging with each of said spur-wheels; transmitting mechanism whereby said gear-wheel is caused to revolve independently of said drum, the ratio of the revolution transmitted being such that all of said napping-rollers present for action at said operative points but one variety of napping material during any given continuous napping operation, substantially as described.

6. A napping-drum carrying a series of rollers mounted circumferentially upon it, each of said rollers having its surface divided into two or more longitudinal sections, said sections being covered respectively with teasels and with metallic wire clothing, substantially as described.

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Witnesses:

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