March 10, 1959 W. MIESSEN 2,876,523

NAPPING MACHINES

Filed March 29, 1954 2 Sheets-Sheet 1

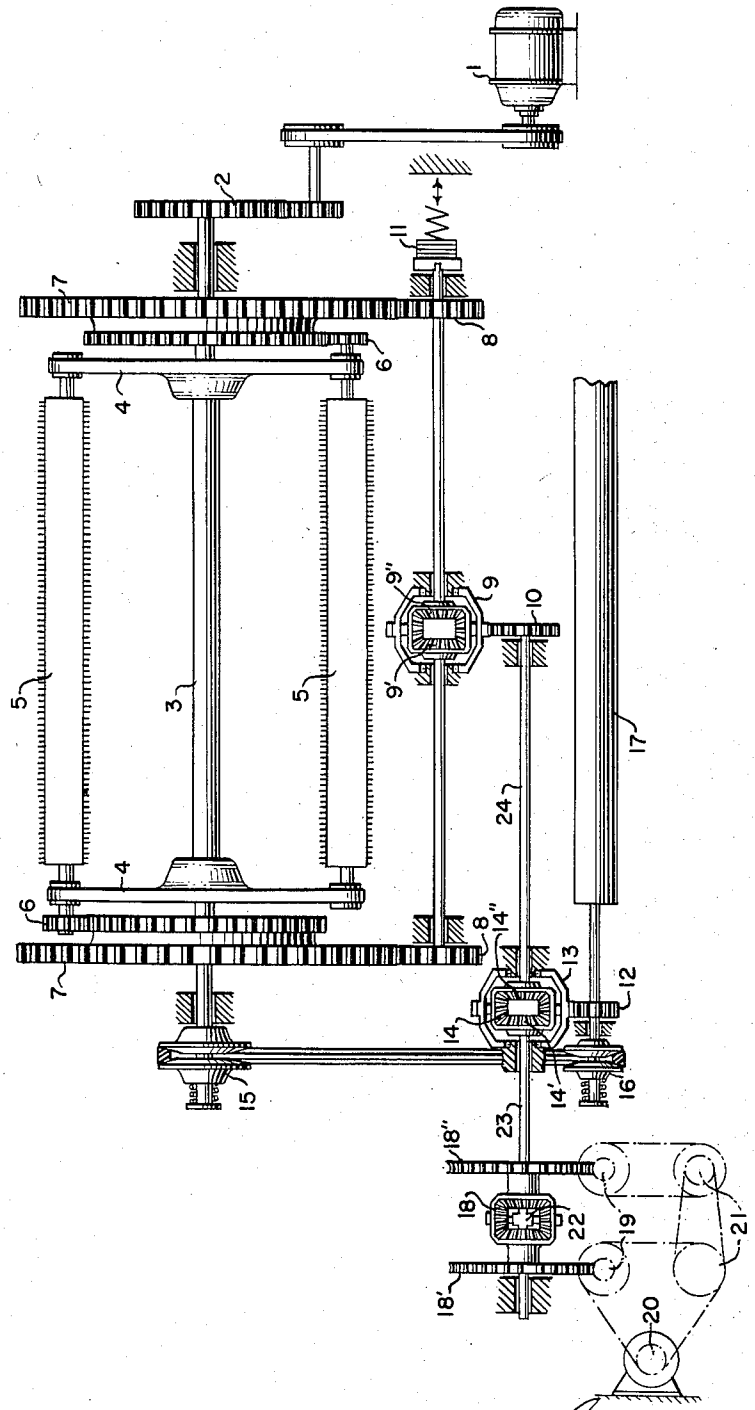

FIG. 1

INVENTOR
W. MIESSEN

BY Glascock Downing & Seebold
ATTORNEYS

March 10, 1959 W. MIESSEN 2,876,523

NAPPING MACHINES

Filed March 29, 1954

2 Sheets-Sheet 2

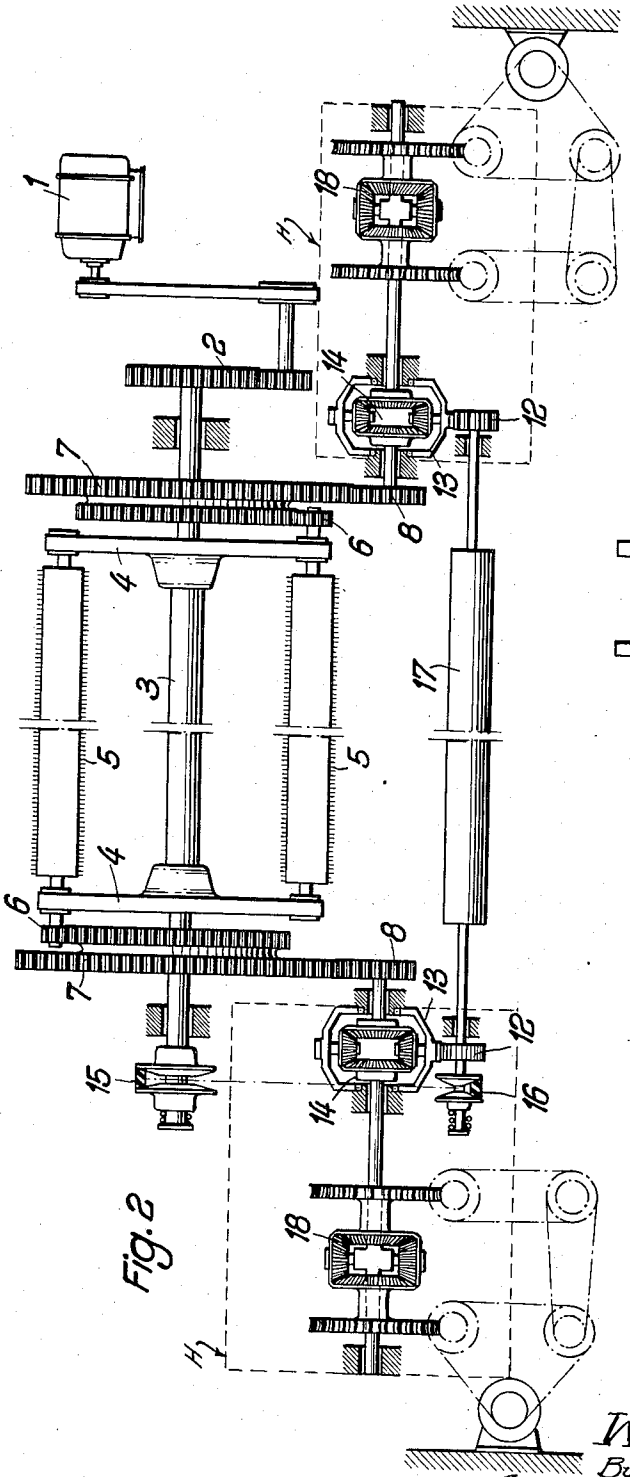

Fig. 2

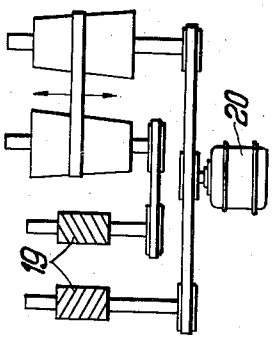

Fig. 3

Inventor:
W. Miessen
By
Glascock Downing & Seebold
Atty's

United States Patent Office 2,876,523
Patented Mar. 10, 1959

2,876,523

NAPPING MACHINES

Walter Miessen, Viersen/Rhineland, Germany, assignor to Joseph Monforts and Casper Monforts, trading as the firm A. Monforts, Munich-Gladbach, Germany

Application March 29, 1954, Serial No. 419,547

Claims priority, application Germany April 16, 1953

6 Claims. (Cl. 26—35)

This invention relates to a roughening or nap-raising machine. As is known, the roughening effect is produced through certain relations being established between the speeds of the roughening drum, the roughening rollers and the material. In addition, the roughening effect depends on the extent to which the roughening rollers come into action on the webs of material.

In roughening or teaseling fabrics, it is important to determine what adjustments are feasible for the desired effects. It was shown that the relative speed of the roughening elements moving on hypocyclodial paths and the advancing fabric, is essential for the roughening effect. Heretofore, the adjustment of the speed of the several roughening elements was effected in such a fashion that each element was adjusted separately, and, this adjustment was based on the skill and the experience of the operator. It is also apparent that in moving the fabric with varying speed, it is necessary also to adjust the roughening rollers accordingly, if the same roughening effect is to be achieved. In such a situation, the difference of the roller speed with respect to the fabric speed must remain constant.

The napping machine includes a rotary drum, provided on its periphery with a plurality of napping (worker) rollers rotatable with the drum as well as rotatable per se. The worker rollers include fabric engaging members or needles which are directed with the pile worker in the direction of rotation of the drum while those of the counterpile workers are directed in the opposite direction. The pile workers and the counterpile workers alternate at the periphery of the drum. With the working rollers rotating with the drum, the pile workers receive their drive on one side face of the machine and the counterpile workers on the other side face.

In contradistinction to the prior art, the rotary speeds of the worker rollers are varied by external gears, and, not by friction rings or belt drives.

The fabric web is placed about the drum and worker rollers and is moved by special conveying rollers. The worker rollers, provided with gears are driven by the rotation of the drum and are driven with the assistance of the external gear rings disposed on the side faces so that the peripheral speed of the pile workers is lower and that of the counterpile workers is higher than the conveying speed of the fabric web whereby many fibers are extracted by the needles from the fabric body to impart a "wooly down" to the fabric. The thickness and density of the "wooly down" can be varied by different adjustments of the travel speed of the web, by altering the rotary speed of the drum and by changing the peripheral speed of the pile workers and counterpile workers in the same or different ratio. This is referred to as "adjustment of a certain napping effect."

For the operation, the following factors are important:

(1) Speed of the fabric web,
(2) Rotary speed of the drum,

(3) Peripheral speed of the gear ring driving the pile workers, and
(4) Peripheral speed of the gear ring driving the counterpile workers.

Further particulars of the invention will be gathered from the following description:

Figure 1 shows the diagrammatic arrangement of a roughening machine in which pile rollers driving with the grain and counter-pile rollers driving against the grain are coupled;

Figure 2 shows the construction of a machine with a separate drive for the pile and counter-pile rollers, while Figure 3 shows details for the sensitive regulating drive.

The motor **1** drives by way of a V-belt and toothed wheel gearing **2** the roughening drum shaft **3**, with which the drum heads **4** are rigidly connected in the usual manner. In the drum heads **4** the roughening rollers **5** are supported. On the free shaft ends of the latter are mounted alternately the pinions **6** for driving the roughening rollers, namely with the grain and against the grain, by means of the ring gears **7**. Each gear **7** is provided with inner and outer teeth and the outer teeth mesh with a pinion **8** while the inner teeth mesh with the pinions **6**. These ring gears are mounted rotatably on the drum shaft and through their differential rotation with respect to the web of material bring about the roughening effect both with the grain and against the grain. The two ring gears are coupled by means of the pinions **8** to a differential **9** which is itself rotatable by the gear wheel **10**. For equalising the moments required alternately with the grain and against the grain the bevel rims of the differential **9** can be additionally loaded or unloaded, which is diagrammatically illustrated by the brake **11**. The pinion **10** will then have a rotation imparted to it which is composed of two magnitudes.

The first magnitude takes into account the velocity at which the material is moved through the machine. For producing this rotary motion the gear wheel **12** which is fixed on the pull roller or material conveying roller **17** cooperates with a differential **14**. The differential includes a housing **13** having an outer gear in mesh with the gear wheel **12**, a sun wheel **14'** and a second sun wheel **14''**. Shaft **23** secured to sun wheel **14'** carries spur wheel **18''** of differential drive **18** also having spur wheel **18'**. Motor **20** and two cones **21** through worm gearing **19** permits the spur wheels **18'** and **18''** to be adjusted to the same or different rotary speeds or the speed previously selected can be altered. The sun and planet gears journaled on cross member **22** of the shaft **23** turn the shaft **23** at a speed which results from the rotary speed of the two spur wheels **18'** and **18''**. Hence, the differential drive **18** is a summation drive.

The rotation of the shaft **23** is transmitted to the sun wheel **14'** and the housing **13** is driven by gear **12** in relation to the speed of the fabric web. The speeds of the sun wheel **14'** and the housing **13** effect a resulting rotation of the sun wheel **14''** which is transmitted by shaft **24** to gear **10**. The rotation of the gear **10** is transmitted to the planet wheel support of the differential drive **9** whereby both sun wheels **9'** and **9''** turn at the same speed and in the same direction unless one of the two gears **8** has to overcome a greater resistance than the other. Of the two gears **8**, one functions for adjustment and change of the pile worker's speed and the other for adjusting and changing the counterpile worker's speed by means of ring gears **7**.

The differential drives **9**, **14** and **18** serve the following purposes:

The drive **9** functions to transmit the corrected napping effect adjustment to the pile workers and the counterpile workers. The drive **14** is for influencing the napping

effect adjustment by the travel speed of the fabric web and the drive **18** for the adjustment and change of the napping effect by the operator.

The mechanical coupling of the four motions previously mentioned to one another by means of the differential drive **14** is a salient aspect of the invention. If one of the motions is changed, the others are also automatically changed so that the drive **14** is a summation drive in which all factors are always changed at the same time. Hence, the drive **14** combines the three functions most important for the machine, namely, napping effect adjustment, travel speed of the fabric web and worker rollers drive.

The roller **17** is driven by a steplessly variable transmission drive **15—16** in a manner known in the art.

Figure 3 shows in detail the construction of the worm gears **19**, motor **20** and cones **21**. The worms **19**, which are left-handed or right-handed according to the direction of rotation of the worm wheels, are driven, one of them directly by the motor and the other by the same motor through the interposed cone drive **21** of gradual taper.

Figure 2 gives a further illustration of the invention, in which in contradistinction to Figure 1, the two roughening roller drives are driven separately, the arrangement being such that each of the ring gears **7** can be driven by a separate regulating drive mounted in a housing H secured to the machine frame. It will be seen in this embodiment that the differential **9** of Fig. 1 is eliminated, and the operation of the two differential drives **14** and **18** at each end of the machine is the same as described in connection with Fig. 1.

In roughening different kinds of materials the napping effect of the roughening rollers can only be increased up to a certain degree. Should this value be exceeded, the destruction of the fabric will result.

I claim:

1. A textile napping machine comprising a rotatable cylindrical drum, a drive for the drum, a plurality of rotary pile working elements arranged on the periphery of the drum with such elements alternately disposed as pile working members and counterpile working members, stepless drives for driving the pile working elements, adjusting means for varying the rotary speed of the pile working members and counterpile working members and conveying means for a fabric web guided over the pile working elements, the improvement including a three-part differential drive, one of said parts being operatively connected to the conveying means for the fabric web, another of said parts being connected to the drive for the pile working elements and the other part being operatively connected to the adjusting means.

2. A napping machine as defined in claim 1 wherein the differential drive includes two sun wheels and a rotating planet wheel, with the planet wheel connected to the conveying means, one sun wheel with the adjusting means and the other sun wheel with the drive for the pile working elements.

3. A napping machine as defined in claim 1 wherein an additional differential drive is provided, the planet wheel of which is rotated by one part of the first differential drive, one of the sun wheels of the additional differential drive being operatively connected to the drive of the pile working members and the other sun wheel being operatively connected to the drive of the counterpile working members.

4. A napping machine as defined in claim 1 wherein the part of the differential drive connected to the adjusting means is operatively connected to a further differential drive comprising two sun wheels, each having a spur gear attached thereto, said spur gears capable of being driven at the same or different speeds.

5. A napping machine as defined in claim 4 wherein the further differential drive is operatively connected through its spur gears by worm gearing and a stepless transmission drive with a single drive motor.

6. A napping machine as defined in claim 5 wherein said differential drive and further differential drive are mounted in a common housing secured to the machine frame and operate the drive for the counterpile working members and a similar drive for operating the drive of the pile working members is secured to the opposite side of the frame.

References Cited in the file of this patent

UNITED STATES PATENTS

1,173,565	Ermbter	Feb. 29, 1916
2,120,576	Scholaert	June 14, 1938
2,698,476	Hadley	Jan. 4, 1955

FOREIGN PATENTS

18,029	Great Britain	of 1904