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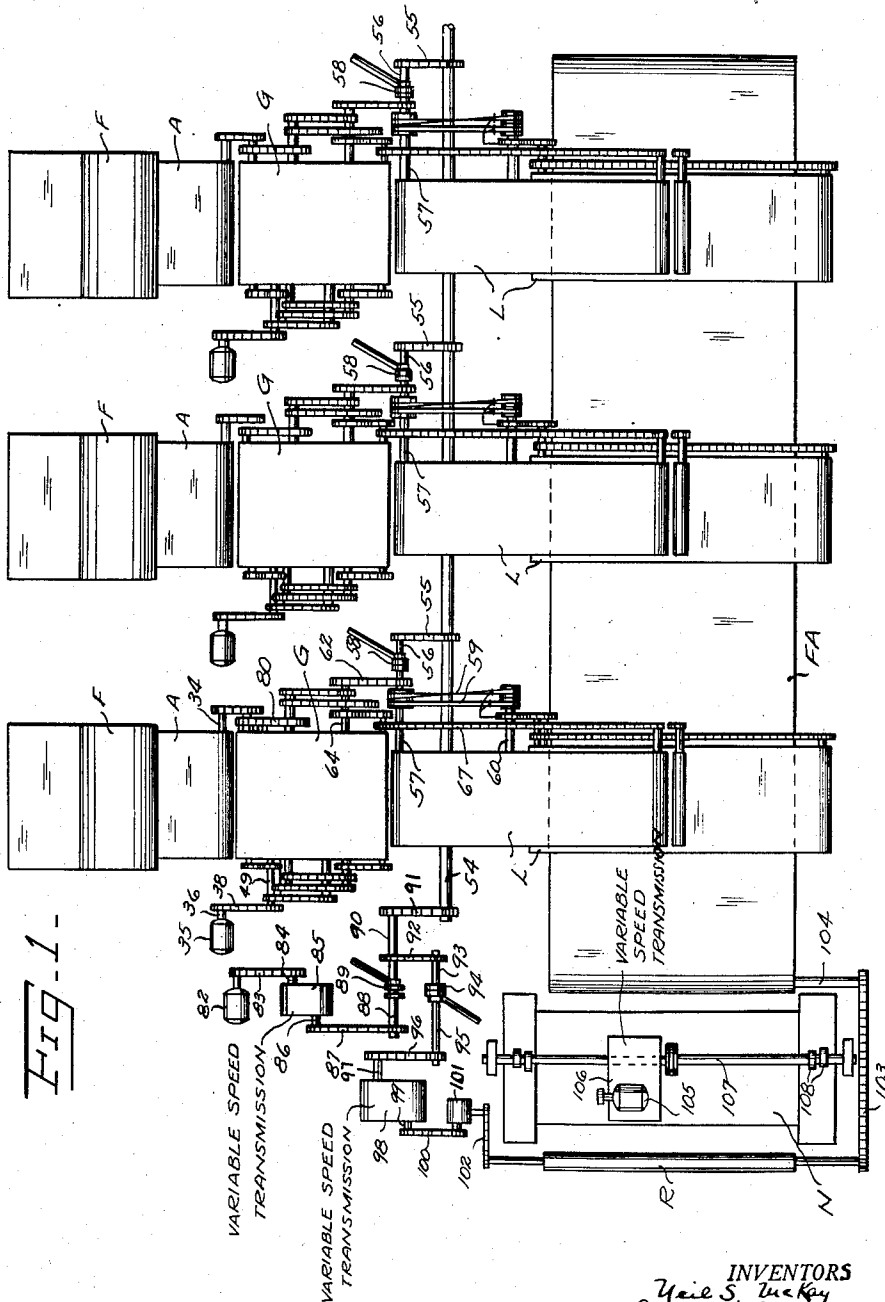
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2,574,580

DRIVE CONTROL SYSTEM FOR FELT PRODUCTION

Filed May 4, 1950

2 SHEETS--SHEET 1



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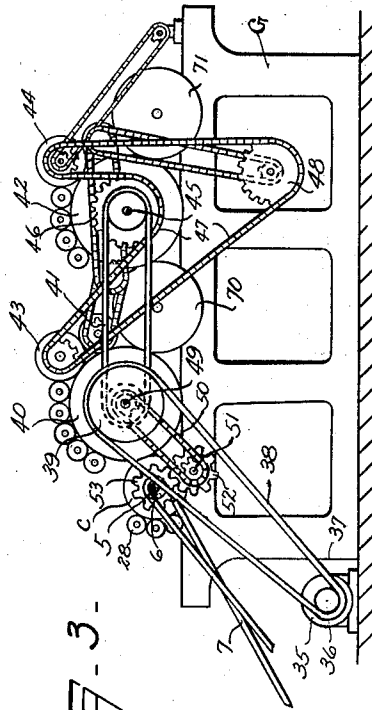
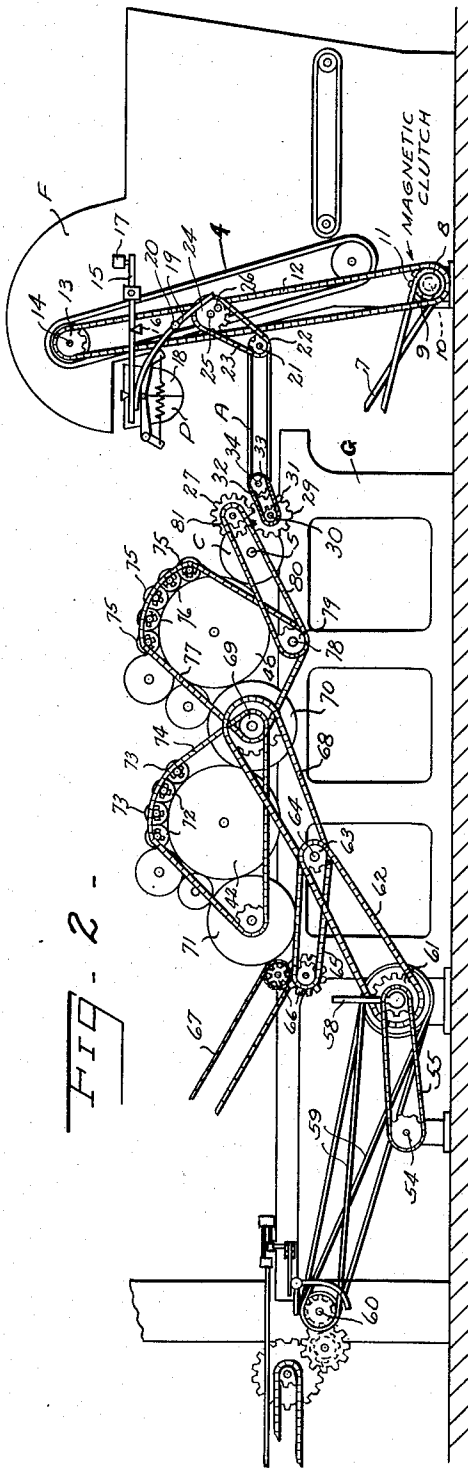
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DRIVE CONTROL SYSTEM FOR FELT PRODUCTION

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2 SHEETS—SHEET 2



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DRIVE CONTROL SYSTEM FOR FELT
PRODUCTION

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4 Claims. (Cl. 28—1)

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The invention relates to manufacture of felted materials and more particularly to a power transmission system for driving the garnetts and the felt punching machine or needle loom supplied by said garnetts at such speeds as to provide a continuous production of finished felt.

The main object of the present invention is to provide a master control drive arrangement which when speeded up, or slowed down, keeps all vital parts synchronized at all times. By the drive control system hereinafter described the rate of production can be readily changed without regard to any fixed ratio of speed while maintaining uniformity of product. Also the present drive system permits adjustment to accommodate all variations in types of fibres and diversity of products without loss of time. In addition, the present system places the operations of the entire unit under the control of the operator, who starts and stops the complete cycle of operations simultaneously. The system has effected a great saving in time and labor costs in the production of felted materials.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a schematic lay out view of a production line having a drive control system embodying the invention:

Fig. 2 is a side elevation view of one side of a garnett, its feed and a portion of the lapper;

Fig. 3 is a side elevation view of the other side of the garnett.

In the making of a piece of felted material, the fibres used must be "carded" or combed out so that they lay more or less parallel to each other and in a uniform web. This is done in a carding machine or garnett. The web produced by the garnett is fed to a lapper whose function is to build up a uniform batt of any desired weight and thickness from the continuous web delivered to it by the garnett. In the garnett if the stock is fed to it at a uniform rate and spread, and the speeds of the various cylinders and rolls doing the carding have been synchronized and gauged to get the desired results and are held at a uniform speed, then the resulting web will be of uniform weight and density. The web being uniform, then the laminated web or batt produced by the lapper will be uniform if its speed across its delivery or "floor" apron is uniform. To build up the thickness of the batt and still maintain uniformity of product, it is necessary to be able to adjust the speed of the lapper relative to the floor

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apron by fixed ratios such as 1 to 1, 2 to 1, 4 to 1, 6 to 1, 8 to 1, etc., due to the necessity of having the edges of the web coincide, and not overlap or leave gaps between the layers. The batts are then fed to a needle loom which may, for example, be of the type shown in U. S. Patent No. 2,004,709, dated June 11, 1933, to Robert S. Phillips. With such looms when the needle board is filled with new needles, its capacity for work is far greater than when some of the needles are dulled or worn, and accordingly the efficiency of the needle loom varies with the condition of its needles and to compensate for the dulling of the needles, the feed of stock or batts to the puncher or loom must be slowed down. All the above variables in the manufacture of a piece of felted material as a continuous process have been taken care of by the drive system hereinafter described.

Referring to Figs. 1 and 2, the raw stock or fibres is delivered from a storage bin, not shown, to a feeder F which has an automatic scale pan P from which the stock is delivered to the garnett feed apron A which carries it to the garnett G which delivers the carded stock to the lapper L which deposits the layers of carded stock upon the floor apron FA which in turn delivers the felt batts to the puncher or needle loom N from which the finished felt is removed by pull out rolls R. The floor apron is usually supplied by a plurality of lappers, garnetts, and their feeders.

Referring to Figs. 2 and 3, the feeder F has one of its feed aprons 4 driven from the shaft 5 of the lickin cylinder C of the garnett G through a pulley 6 on this shaft connected by a cross belt 7 with a pulley 8 that is adapted to be connected by a magnetic clutch 9 with a shaft 10 of the feeder F, which shaft carries a sprocket 11 connected by a chain 12 to a sprocket 13 on a shaft 14 which drives the feed apron 4. Thus the speed of the feed apron 4 which supplies raw stock to the scale pan P is dependent upon the speed of the garnett. The scale pan P is mounted on a pair of counterbalanced or weighted levers 15 (one being shown) pivoted intermediate their ends at 16 and adapted when the pan is full of stock to engage and open a normally closed micro-switch 17 which opens a circuit, not shown, to the magnetic clutch 9 and thus stops the drive to the apron 4 whenever the scale pan P is full. The scale pan P is usually in the form of an openable bucket having hingedly connected bucket sections 18 connected together by suitable linkage which is moved to open or discharge position by a trip lever 19 pivotally supported at 20 and controlled from the garnett feed apron A by an apron

shaft 21, sprocket 22 on said shaft connected by a chain 23 to a sprocket 24 on a shaft 25 which sprocket carries a pin 26 that once during each revolution of said sprocket engages the lever 19 to cause it to open the bucket sections 18 to deposit the fibres from the feeder in a spread out condition on the feed apron.

The garnett feed apron A receives its drive from the garnett through a gear 27 on the feed roll 28 meshing with a gear 29 on a shaft 30 which carries a sprocket 31 connected by a chain 32 to a sprocket 33 on an apron roll drive shaft 34.

Certain parts of the garnett G are driven by a constant speed electric motor 35 whose shaft 36 carries a sheave 37 connected by a belt 38 with a flat pulley 39 driving the first main cylinder 40 which is connected by a belt and pulley drive 41 with the second main cylinder 42. The first fancy roll 43 and the second fancy roll 44 are connected to be driven from the shaft 45 of the cylinder 42 by a sprocket 46 on said shaft, and a chain 47 running over sprockets on the shafts for the rolls 43 and 44 and an idler sprocket 48. The shaft 49 of the first cylinder 40 has a chain and sprocket drive connection 50 with a shaft 51 carrying a gear 52 meshing with a gear 53 on the shaft 5 of the lickerin cylinder. Chain drives for some of the other parts of the garnett are also shown in Fig. 3, but are not necessary for an understanding of the present invention.

For this invention, the important drives for the garnett are those shown in Fig. 2, which drives control the speed of travel of the stock through the garnett. In this figure, the numeral 54 designates a main drive shaft for all the garnetts G shown in Fig. 1, which shaft is connected to each of the garnetts by a chain and sprocket drive connection 55 to a shaft 56 which is connected to a unit drive shaft 57 by a manually controlled clutch 58. The shaft 57 has a reversible belt and pulley drive connection 59 with a lapper drive shaft 60 and also carries a sprocket 61 connected by a chain 62 to a sprocket 63 on a lay shaft 64. The lay shaft 64 also has a chain and sprocket drive connection 65 with gearing 66 that drives the lapper apron drive chain 67 and also a chain and sprocket drive connection 68 with a shaft 69 carrying the transfer doffer cylinder 70. The doffer cylinder 71, the strippers 72, and workers 73 associated with the second main cylinder 42 all carry sprockets driven by a chain 74 from a sprocket on the shaft 69. The strippers 75 and workers 76 associated with the first main cylinder 40 all carry sprockets driven by a chain 77 from another sprocket on the shaft 69, said chain also driving a sprocket on a shaft 78 carrying a sprocket 79 connected by a chain 80 with a sprocket 81 on the feed roll 28 which it will be recalled also drives the feed apron A which in turn drives the control for the feeder scale pan P. To avoid confusion, no attempt has been made to show the various small rolls above referred to in the plan view of Fig. 1. Thus changing the speed of the main drive shaft 54 changes the speed of all the stock feed elements of the garnett referred to in connection with the description of Fig. 2, the feed apron A, the feeder scale pan P, and the lapper L.

Referring now to Fig. 1, a constant speed main drive electric motor 82 has a chain and sprocket drive connection 83 with the input shaft 84 of a variable speed transmission mechanism 85 whose output shaft 86 has a chain and sprocket drive connection 87 with a lay shaft 88 adapted

through a manually operable master control clutch 89 to be connected to a shaft 90. Shaft 90 has a chain and sprocket drive connection 91 with the main drive shaft 54 and also a chain and sprocket drive connection 92 with a shaft 93 which through a manually controlled clutch 94 is connectible with a shaft 95. It will be understood that instead of the electric motor 82 and the mechanically variable transmission 85 other forms of variable speed power control drive means may be used. Shaft 95 is connected by a chain and sprocket drive connection 96 to the input shaft 97 of a variable speed drive transmission 98 whose output shaft 99 is connected by a chain and sprocket drive connection 100 with the input side of a reduction gear box 101 whose output shaft is connected by a chain and sprocket drive 102 to one of the pull out rolls R of the puncher N, which roll is also connected by a chain and sprocket drive connection 103 to the drive shaft 104 for the floor apron FA.

The needleboard for the needle loom receives its drive from a separate motor 105 operatively connected to a change speed transmission mechanism 106 whose output shaft drives a shaft 107 that carries eccentrics 108 for reciprocating the needle board and lower grid of the said loom shown in said U. S. Patent No. 2,004,709.

With the above construction since both the drive shaft 54 and the shaft 95 are connected to the shaft 90 which receives its drive from the motor 82 through the variable speed transmission 85, the speed of the pull out rolls R of the puncher will be changed simultaneously with that of the garnett, lapper, etc., driven by the shaft 54 to take care of changes in condition of the needles on the needle board of the puncher, and the variable speed transmission 98 may also vary the speed of the pull out rolls R and the apron drive shaft 104. The variable speed unit 98, therefore, serves to permit a fine adjustment for synchronizing floor apron speed with the speed of the lapper to get proper "butting" of the webs laid down by the lapper. Once this adjustment is made for any given product it is not materially changed. For changing the ratios of speeds of the floor apron relative to the lapper or lappers as heretofore mentioned, the ratios of the sprockets used in chain drive connections 55 can be individually changed, so that on an increase in speed of any one of the shafts 56 the particular garnett and lapper driven thereby is speeded up relative to the floor apron to deposit two or more webs on the floor apron to form a thicker batt.

For putting the system in operation, the garnett motors 35, the motor 105 of the puncher with drive to shaft 107 disconnected and the motor 82 with clutch 89 disengaged are started while clutches 94 and 58 are engaged. The main drive shaft clutch 89 is then simultaneously engaged with the clutch (not shown) connecting the shaft 107 with its drive motor 105.

With the above arrangement the speeding up or slowing down of the shaft 90 through the adjustment of the transmission 85 keeps all the feed elements of the garnett, lapper, floor apron, and puncher synchronized at all times, so that the rate of production can be changed without regard to any fixed ratio of speeds to maintain the desired uniformity of product. Also the speed adjustments permit adjustments for variations in types of fibres and products made therefrom with practically no loss in time. Also the operations of the entire production unit such as shown in Fig. 1 are under the control of one

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operator who starts and stops the complete cycle of operations simultaneously.

We desire it to be understood that this invention is not to be limited to any particular form or arrangement of parts except only in so far as such limitations are included in the claims.

What we claim as our invention is:

1. In a felted material production unit having a garnett, a lapper, a floor apron, and a needle loom having pull out rolls for the finished material, said garnett having feeding elements, the combination of a shaft, drive connections between said shaft and said garnett feeding elements, drive connections between said shaft and said lapper, a second shaft, drive connections between said second shaft and said pull out rolls and said floor apron, a variable speed control power drive, and drive connections between said power drive and said first and second shafts.

2. The felted material production unit as defined in claim 1 in which the drive connections between said control drive and said first and second shafts include a manually operable clutch.

3. In a felted material production unit having a garnett, a garnett feeder including a scale pan, a lapper, a floor apron, and a needle loom having pull out rolls for the finished felt, said garnett having feeding elements, the combination of means for driving said garnett feeding elements, means controlled by said driving means for controlling the operation of said scale pan, means for driving said lapper, a shaft operatively con-

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nected to said means for driving said garnett feeding elements and the means for driving said lapper, means for driving said pull out rolls, means for driving said floor apron, a shaft operatively connected to said means for driving said pull out rolls and said means for driving said floor apron, and a variable speed control power drive operatively connected to both of said shafts for simultaneously driving the same.

4. The structure as defined in claim 1 wherein the drive from said first shaft to said garnett feeding elements and said lapper is controlled by a manually operable clutch, and the drive connections to said second shaft is controlled by a manually operable clutch.

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