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B. A. MALKIN

1,769,355

DRIVE FOR PAPER MAKING MACHINES

Filed Aug. 8, 1928

3 Sheets-Sheet 1

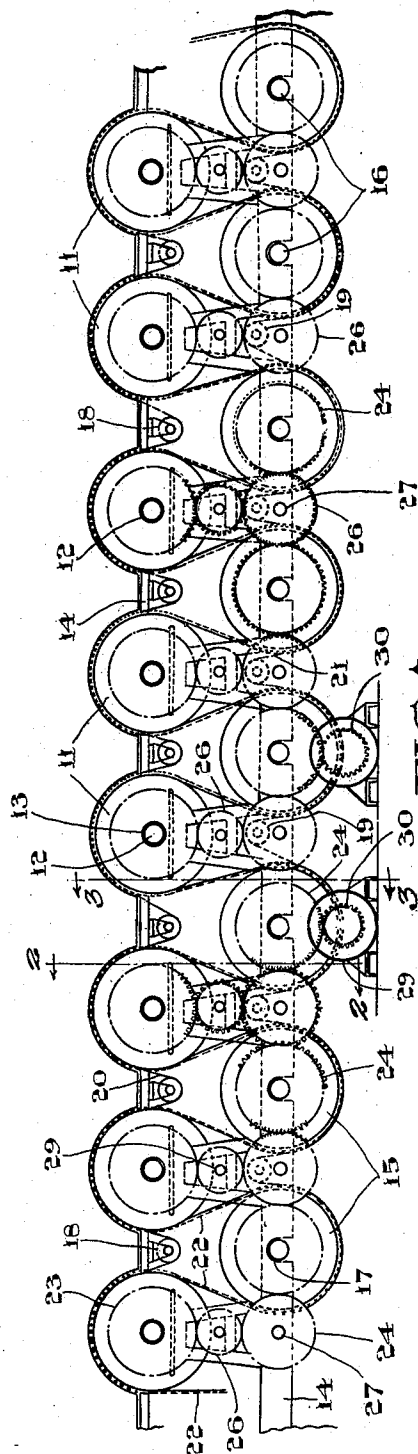


FIG. 1

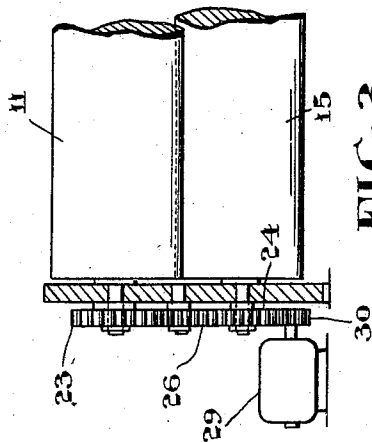


FIG. 3

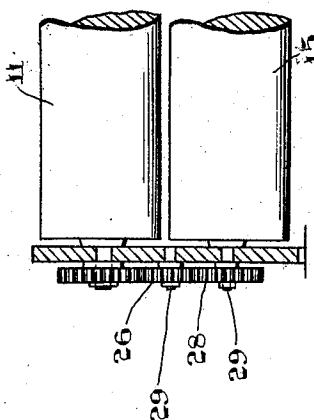


FIG. 2

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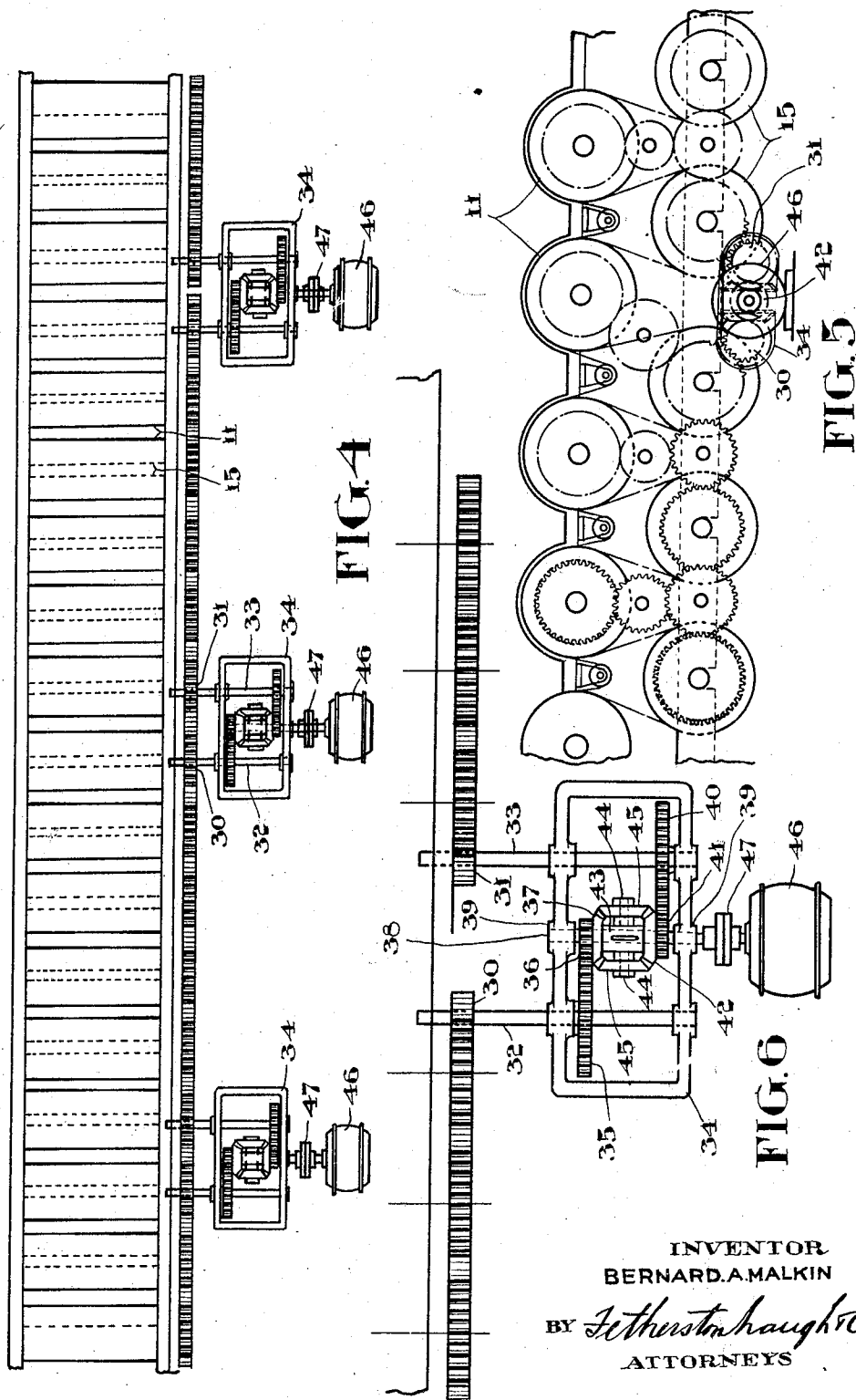
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DRIVE FOR PAPER MAKING MACHINES

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3 Sheets-Sheet 2



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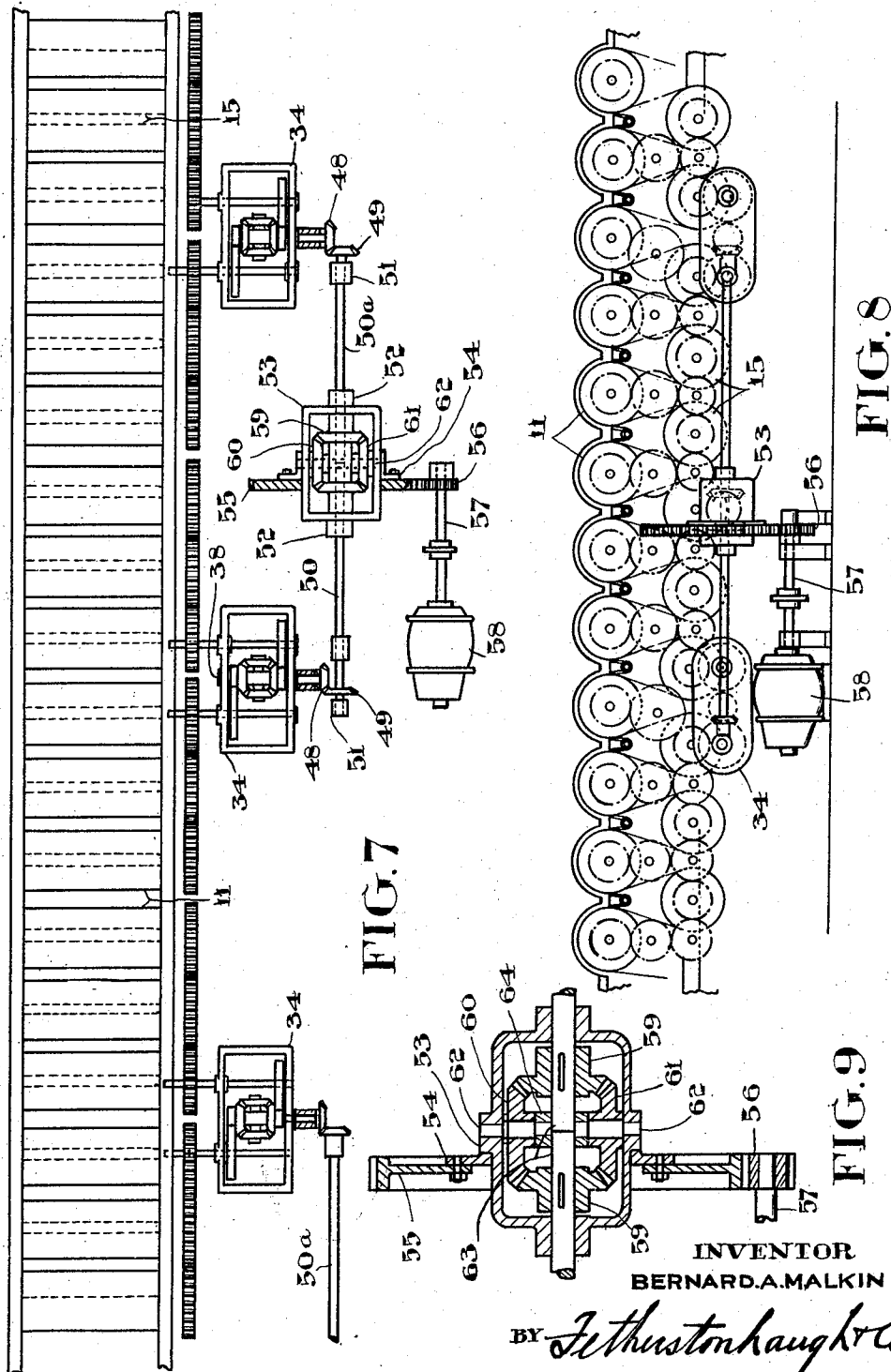
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DRIVE FOR PAPER MAKING MACHINES

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3 Sheets-Sheet 3



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DRIVE FOR PAPER-MAKING MACHINES

Application filed August 8, 1928. Serial No. 298,344.

This invention relates to new and useful improvements in drives for paper making machines and particularly to the drives for the drier sections. The main object of the invention is to provide a drier section which will be more accessible than has been heretofore attained in any of the drives at present in use.

Another object is to provide a drier section drive by which the felt tension will be controlled and the speed of the motors is synchronized to conform to the natural shrinkage thereof, resulting in a stronger sheet of paper and less breakage.

According to my invention I provide a drier section consisting of a plurality of rolls divided into small groups each group being driven by a separate motor, or other means. The only synchronizing means is the drier felt, so that the felt tension is controlled and the drier speed conforms to the natural shrinkage of the felt during the drying process and as this shrinkage conforms to the natural shrinkage of the paper, a stronger sheet results and fewer breakages are encountered than in driers where the speed of the rolls throughout the machine is uniform.

In the drawings which illustrate my invention:—

Figure 1 is a part side elevation of a drier section of a paper making machine showing my preferred form of improved driving mechanism.

Figure 2 is a part sectional end elevation taken on the line 2—2 Figure 1.

Figure 3 is a part sectional end elevation taken on the line 3—3 Figure 1.

Figure 4 is a part plan of a drier section of a paper making machine showing one of the modifications which may be made to the driving mechanism shown in Figures 1 to 3, inclusive.

Figure 5 is a part side elevation of one of the motors shown in Figure 4 and showing its driving connection to the drier rolls.

Figure 6 is a part plan view on an enlarged scale of the mechanism shown in Figure 5.

Figure 7 is a plan view of a drier section

showing a further modification which may be made to the mechanism shown in Figure 1.

Figure 8 is a part side elevation of the mechanism shown in Figure 7.

Figure 9 is an enlarged view of one of the driving units in proximity to the motors.

Referring more particularly to the drawings: 11 designates the upper drier rolls which are spaced from one another and arranged in a horizontal row. The rolls are mounted on spindles 12 rotatably held in bearings 13 formed in the frame 14. The lower rolls 15 are arranged in spaced relation and in a horizontal row. Said lower rolls are preferably so arranged that they lie below and midway between the upper rolls. Spindles 16 rotatably mounted in bearings 17 formed in the frame 14, support the lower rolls. Guide rolls 18 are placed between each of the upper rolls and similar guide rolls 19 are placed between the lower rolls. The upper drier felt 20 passes over the top of the upper rolls 11 and under the guide rolls 18 while the lower felt passes under the lower rolls 15 and over the top of the guide rolls 19. The paper sheet designated 22 passes alternately over the top rolls and under the bottom rolls and between said rolls and the felts. The foregoing is descriptive of one type of drying machine now commonly in use and to which my improved driving mechanism hereinafter described is applicable. The upper and lower roll spindles extend beyond the frame. Secured to the upper and lower roll extensions are the toothed wheels 23 and 24. The rolls are driven in batches or groups and for illustrative purposes only I have shown three upper and three lower rolls in each group. Between each pair of toothed wheels 24, attached to the lower roll spindles are the idler toothed wheels 26. The idler wheels 26 are mounted on spindles projecting outwardly from the frame. Idler wheels 28 are rotatably mounted on pins 29 projecting outwardly from the frame and mesh with the idler wheels 26 and the wheels 23 secured to the upper roll spindles. There is no idler wheel connection between each

batch of rolls so that each batch can be run at a different speed from the batches adjacent thereto, to take up the stretch on the paper felt as it passes through the machine.

8 The above details are common to all figures in the drawings. In the drive shown in Figure 1, each group is driven by an independent motor having a toothed pinion 30 which meshes with one of the toothed
10 wheels in the group preferably secured to the lower roll spindles. It will be seen that each group is independently driven and that the only connection between the groups is through the drier felts.

15 In Figures 4, 5 and 6, the adjacent end roll driving wheels of each group are driven by pinions 30 and 31, secured to the shafts 32 and 33 respectively, each shaft being rotatably mounted in a gear case 34. Secured to and rotating with the shaft 32
20 is the toothed wheel 35 which meshes with a toothed pinion 36 adapted to rotate with a bevel wheel 37 rotatably mounted on the motor extension spindle 38, mounted in suitable bearings 39, formed in the gear case 34. A toothed wheel 40 is secured to the shaft 33 and meshes with the toothed pinion 41 adapted to rotate with the bevel wheel 42
25 rotatably mounted on the spindle 38. Keyed to the spindle 38 and between the bevel wheels 37 and 42 is the sleeve 43. Rotatably mounted on pins 44 extending outwardly from the sleeve are the bevel toothed wheels 45, each of which meshes with the bevelled
30 toothed wheels 37 and 42. The motor extension spindle is coupled with the motor 46 by means of the coupling 47. This arrangement allows two batches of six rolls, each batch comprising three upper and three
40 lower rolls to be driven by a common motor in such a manner that the connection between the batches is only through the felts. The gearing connection between the batches is of the differential type so that the felts
45 can be kept at the proper tension between each batch.

In Figures 7 to 9 inclusive a further modification is shown in which one motor is used to drive four batches of six rolls comprising three upper and three lower rolls.
50 To accomplish this, bevel toothed wheels 48 are secured to the spindles 38 instead of coupling them to the motor 46. The wheels 48 mesh with the bevel toothed wheels 49 secured to the shaft 50 and 50^a, rotatably
55 mounted in bearings 51 and 52, the latter being formed in a casing 53, an enlarged view of which is shown in Figure 9. Secured to a flange 54, formed in the casing 53, is the toothed wheel 55 which meshes with a toothed pinion 56 secured to the spindle 57 of a motor 58. Within the casing
60 and secured to the shafts 50 and 50^a are the bevel wheels 59, each of which meshes with bevel wheels 60 and 61 rotatably mounted

on pins 62 projecting inwardly from the inner surface of the casing. The shafts 50 and 50^a are adapted to be driven independently of one another and their adjacent ends 63 are positioned centrally of the casing.
70 Holding the pins 62 in place and also the bevels 60 and 61, a collar 64 is provided in the shafts 50 and 50^a. In the driving mechanism shown in Figures 7 to 9, three sets of differential gears are employed and one
75 motor to drive twenty-four rolls in batches of six.

It will be readily seen that other modifications may be made to the driving mechanism without departing from the spirit of
80 the invention.

It will be seen in operation that each group or batch is independently driven and the only synchronizing means between the groups is the drier felts which are held in tension in the manner well-known in the art but not shown in the accompanying
85 drawing. The felt being kept in tension, it will be seen that the drier speed in the groups will automatically adjust itself by regulating the motor speeds in the drive shown in Figure 1, or through the differential gears as shown in Figures 4 to 9 inclusive, to suit the natural shrinkage or expansion of the felts during the drying of
90 a sheet of paper. As the natural shrinkage of the felt corresponds as nearly as possible to the natural shrinkage of the paper, fewer breakages occur and a stronger sheet of paper is obtained than when using a machine with even speeds throughout. It will
95 also be seen that by arranging the wheels in the manner herein described, easier access to the interior of the machine for inspection and repairs, is obtained than in any of the devices at present in use in paper drying
100 sections.

Having thus described my invention, what I claim is:—

1. In a paper making machine, a drier section, comprising a horizontal row of upper rolls, a horizontal row of lower rolls, said rolls being arranged in groups, toothed gear wheels driving each lower roll, toothed gear wheels for driving each upper roll,
110 idler toothed wheels meshing with the driving wheels of the bottom row of each group, idler toothed wheels between the idler wheels on the bottom row and the driving wheels of the top rolls, differential driving units connected directly with each of said groups,
115 means for operating the said driving units and endless drier felts adapted to pass through the machine and regulate the speed of each group to suit the expansion or contraction of the paper during the drying process.
120

2. In a paper making machine, a drier section including spaced groups of rolls, each group comprising spaced horizontally
130

disposed upper and lower rolls, a motor, differential gearing units connecting the motor with adjacent groups, whereby the latter can be rotated at relatively different speeds, and continuous drier felts between the rolls and forming a balancing medium for the speed of said groups.

3. In a paper making machine, a drier section including spaced groups of rolls, each group comprising spaced horizontally disposed upper and lower rolls suitably geared together, a gear casing, shafts journaled in said casing, pinions carried by said shafts for rotating the adjacent rolls of the respective groups, a motor, differential gearing arranged in said casing and connecting the motor to the aforementioned shafts, whereby said groups can be rotated at relatively different speeds, and continuous drier felts between the rolls and forming a balancing medium for the speed of said groups.

4. In a paper making machine, a drier section including a plurality of spaced groups of rolls, each group comprising horizontally disposed upper and lower rolls, differential gearing units operatively connecting the adjacent groups, whereby the latter can be rotated at relatively different speeds, independently rotatable operating shafts for said units, a motor common to said shafts, a differential gearing connecting the motor with said shafts, and continuous drier felts between the rolls.

In witness whereof, I have hereunto set my hand.

BERNARD A. MALKIN.