

June 17, 1930.

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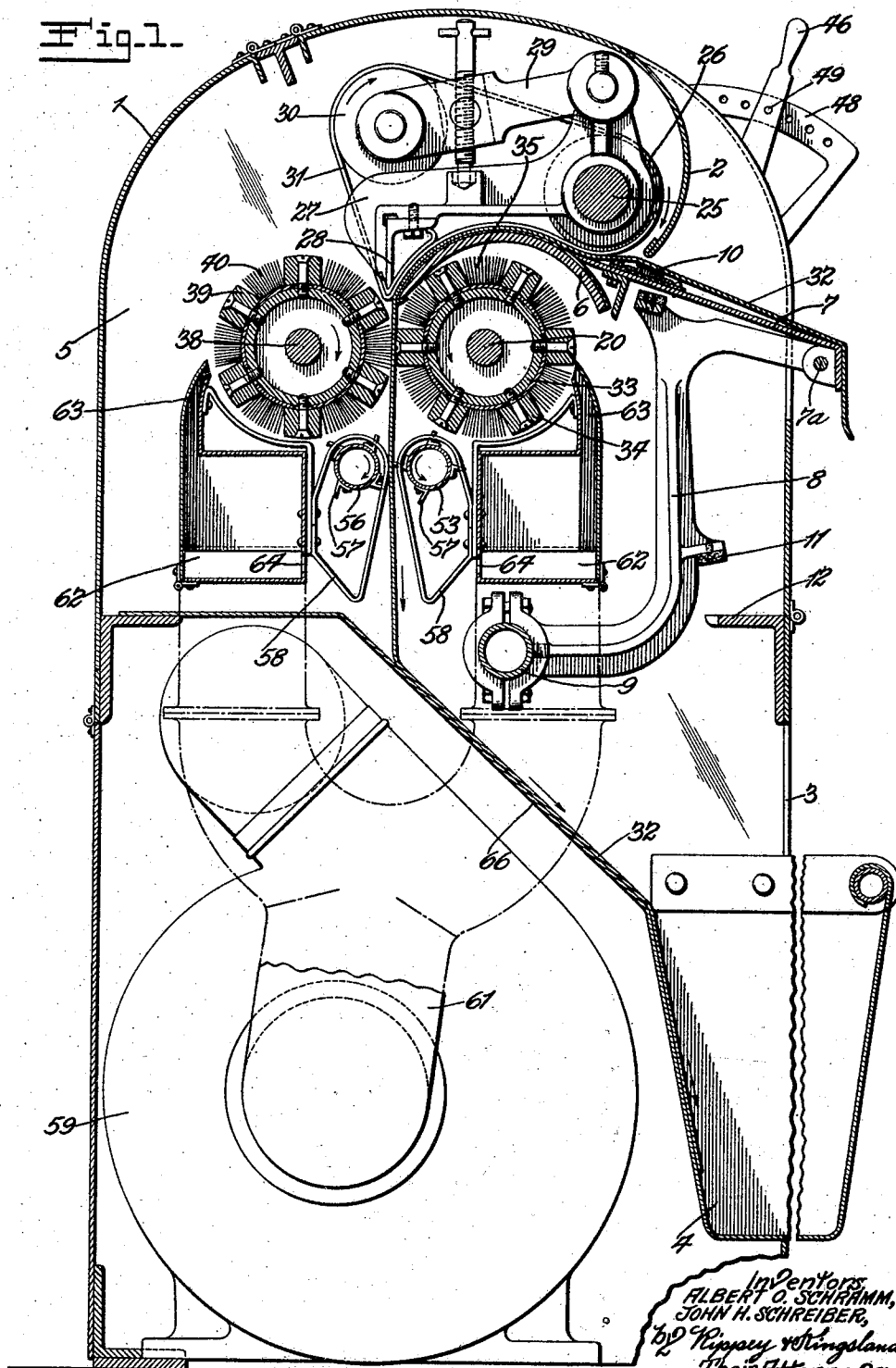
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NAP RAISING MACHINE

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3 Sheets-Sheet 1

Fig. 1.



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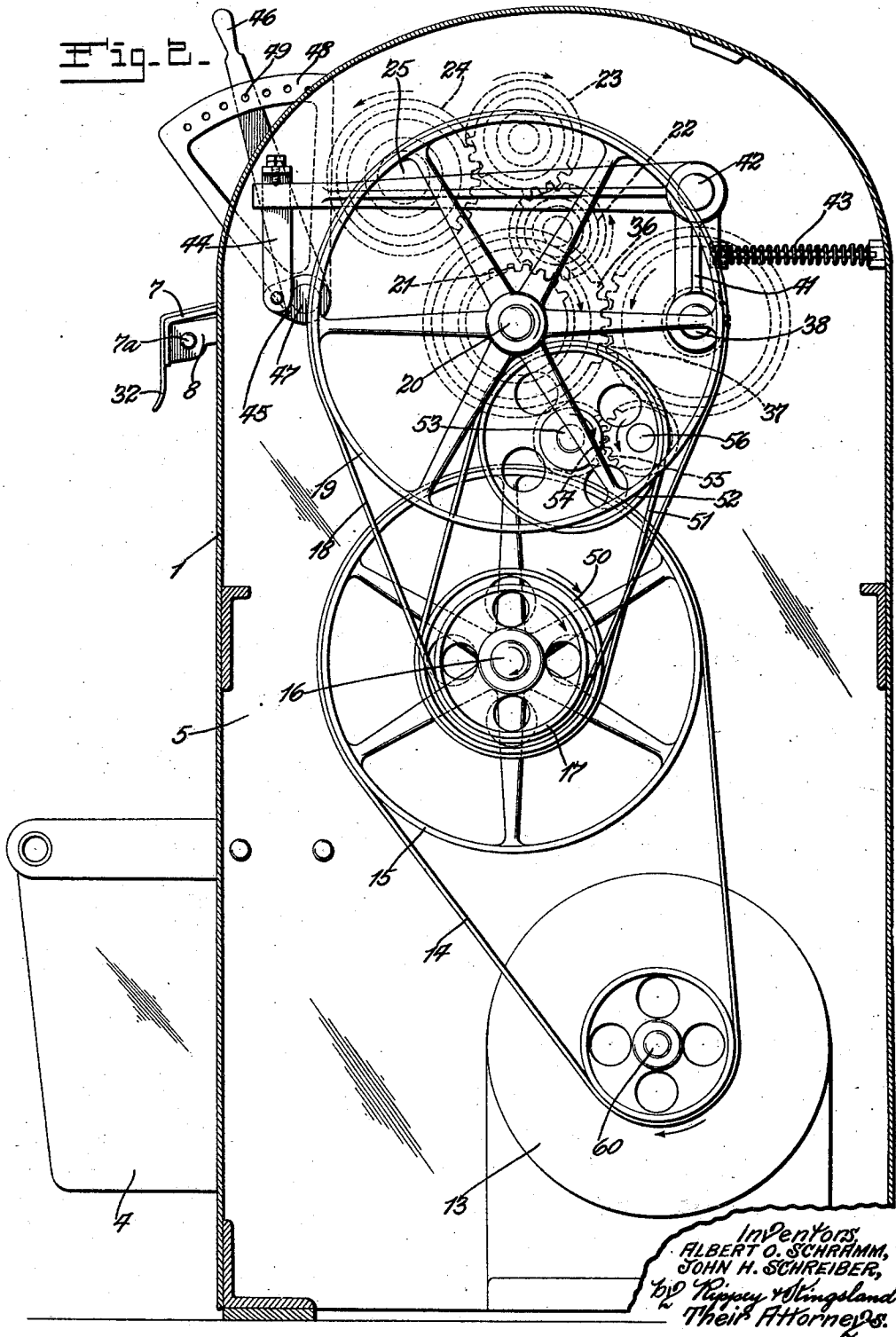
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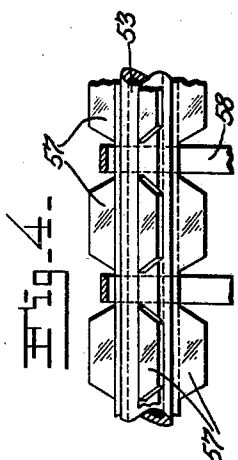
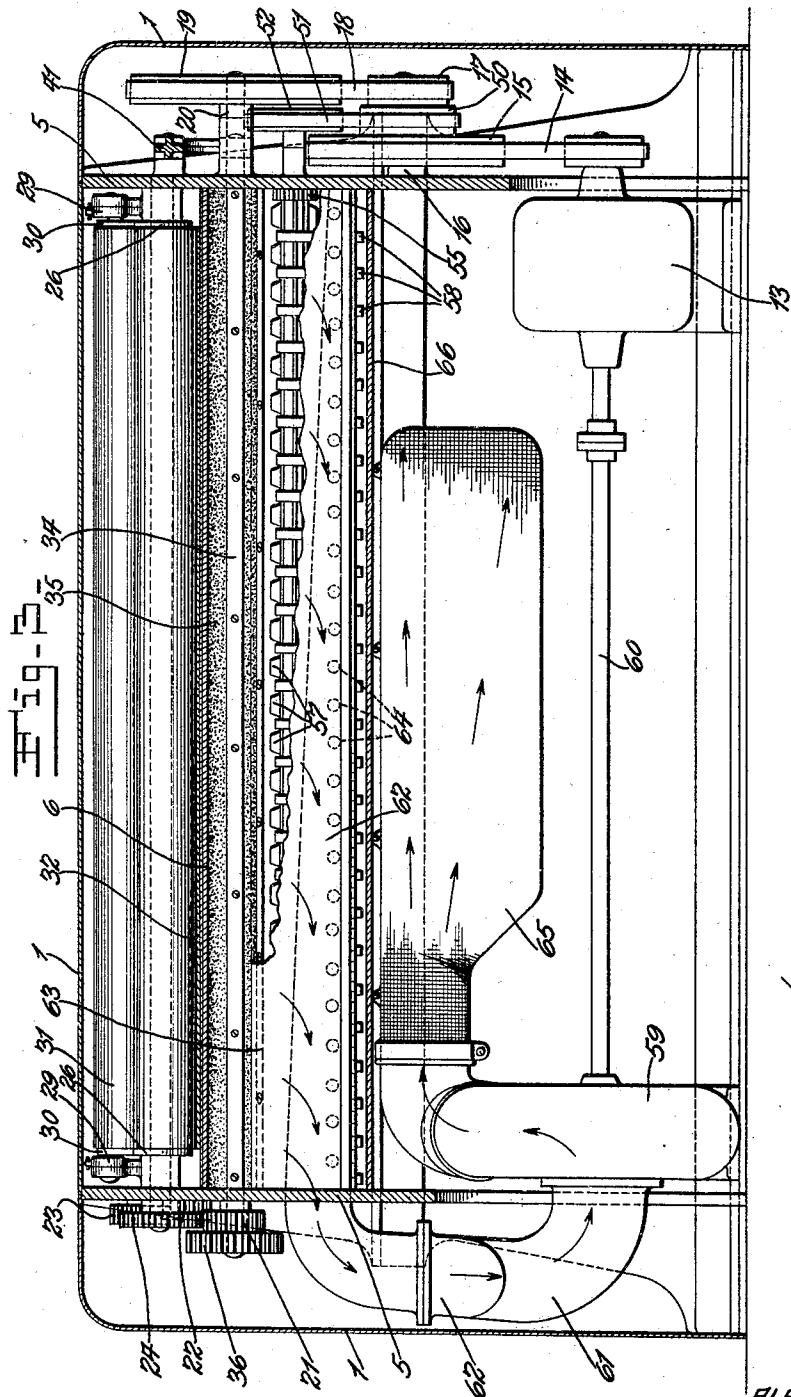
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NAP RAISING MACHINE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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NAP-RAISING MACHINE

Application filed February 17, 1928. Serial No. 254,927.

This invention relates to machines for raising nap on textiles and the like.

An object of the invention is to provide an improved machine for raising the nap on fabrics comprising mechanism for feeding the fabrics to the operating devices continuously and at a rate of speed controlled thereby, in combination with mechanism to subject the fabrics to brushing actions so that the nap of the fabrics will be raised or renewed; and subsequently to beating operations which result in loosening and separating the fibres in the body of the fabric, and forces the loose lint to the surface of the fabric.

Another object of the invention is to provide a machine of the character mentioned wherein the brushing mechanism operates at greater rapidity than the feeding mechanism and alternately on opposite sides of the work to obtain better brushing effect.

Another object of the invention is to provide a machine embodying the mechanisms and devices mentioned with means for withdrawing and discharging from the machine fragments of lint and other materials so that all the fabrics passing through the machine will be discharged therefrom in clean condition.

Another object of the invention is to provide a machine embodying mechanisms for obtaining any or all of the advantageous results made apparent from the following description, reference being made to the drawings, in which,

Fig. 1 is a vertical transverse sectional view of our improved machine.

Fig. 2 is an end elevation, the casing of the machine being shown in section.

Fig. 3 is a vertical sectional view through the casing showing in elevation most of the operating mechanism of the machine.

Fig. 4 is a detail view of a portion of one of the beaters.

Our improved machine is enclosed within a casing 1 of appropriate shape and dimensions and having its top wall curved inwardly at one side, as indicated at 2 (Fig. 1), to provide an opening for the insertion of the work. The machine is also provided with a

discharge opening 3 in which a receptacle 4 is mounted for the reception of the work passing from the machine.

A pair of supporting frames 5 are mounted in the casing 1. An arcuate table 6 is supported by the frames 5 and constitutes a support for the work passing to the nap-raising devices of the machine and is cooperatively related to the work-actuating mechanism. A table 7 is supported by a pivot 7^a on a pair of swinging arms 8. The arms 8 are mounted upon a pivot 9 so that they may be swung outwardly and inwardly from and toward the arcuate table 6. In their inward position the inner edge of the inclined table 7 contacts approximately tangentially with the surface of the support 6. A carding brush 10 is attached to the table 7 near its inner edge and is adapted to be engaged by the work preparatory to operation of the machine. By placing the work upon the carding brush 10 properly the under side of the work will be subjected to the brushing action of the brush 10 and the passage of the work through the machine will be evenly controlled. When the work going through the machine passes beyond the brush 10 the table 7 and the arms 8 supporting the same swing outwardly until the bumpers 11 on said arms 8 rest upon a bracket 12.

The machine is operated by a motor 13. The motor 13 drives a belt 14 engaging a large pulley 15 rigid on a rotary shaft 16. A pulley 17 is rigid on the shaft 16 and drives a belt 18 engaging a pulley 19 rigid on a rotary shaft 20. The shaft 20 has a gear 21 rigid thereon driving a train of gears 22 and 23, the latter of which meshes with a gear 24 rigid on a rotary shaft 25. The shaft 25 has a belt roll 26 attached thereto. A pair of arms 27 have their outer ends attached to the shaft 25 and their inner ends supporting a rounded belt guide 28. Arms 29 are pivotally supported by the arms 27 above the shaft 25 and at their inner ends support a roll 30. A belt 31 is mounted on the rolls 26 and 30 and extends under the guide 28 and is thereby guided so as to cooperate with the arcuate table or work guide 6. Thus, when the work com-

prising a sheet of fabric 32 is engaged with the carding brush 10 and the table 7 is raised until its inner edge contacts with the arcuate table or support 6, the inner edge of the fabric will be engaged by the belt 31 and the fabric will be drawn inwardly across the upper edge of said table 6 and the inner edge of the fabric deflected downwardly to the nap-raising devices.

The shaft 20 supports a drum 33 having secured thereto a longitudinal series of radial bars 34. The bars 34 are in spaced relationship and in each space between said bars a longitudinal brush 35 is secured to the drum 33. Thus, the shaft 20 supports and rotates the nap-raising device comprising the bars 34 and the brushes 35.

The shaft 20 has a gear 36 rigid thereon meshing with a gear 37 rigid on a rotary shaft 38. This shaft 38 supports a nap-raising device similar in all respects to the nap-raising device mounted on the shaft 20 and comprising a series of spaced radial bars 39 and a longitudinal brush 40 in each of the spaces between said bars. Thus, the shafts 20 and 38 are rotated in unison and in opposite directions in a relationship in which the brush on each shaft is opposite and cooperatively related to one of the bars on the other shaft. That is to say, as the said shafts are rotated, the bars 34 on the shaft 20 are successively brought opposite the respective brushes 40 on the shaft 38, and vice versa. These brushes are in such relationship that they will press the sheets of fabric 32 against the corresponding bars on the other shaft and, by a brushing action, will raise the nap.

It is an important feature of the invention that the shafts 20 and 38 and the nap-raising brushes and devices supported and operated thereby rotate and move at a greater rate of speed than the fabric is fed thereto by the fabric-feeding mechanism comprising the belt 31. And, while the belt 31 functions to feed the fabric forwardly, it also functions to retard the movement of the fabric by the nap-raising devices and to control the rate of speed at which the fabric may be moved through the machine.

The shaft 38 is rotatively supported by downwardly extending arms of bell crank levers 41 mounted on pivots 42. A spring 43 is arranged to operate each of the bell crank levers 41 in a direction to actuate the shaft 38 toward the shaft 20 and thus yieldingly hold the nap-raising devices in their closest positions. The opposite arm of the bell crank lever 41 engages a link 44 pivoted to an arm 45 attached to a lever 46 mounted on a pivot 47. Thus, the arm 45 may be rocked to depress the arm of the bell crank lever 41 engaged with the link 44 and thereby move the shaft 38 in a direction away from the shaft 20 to adjust the nap-raising

devices for relatively thick fabrics. Such movement of the shaft 38 away from the shaft 20, however, is relatively slight and does not disengage the gears 36 and 37, but leaves said gears in engagement so that the shaft 38 will be rotated by the shaft 20. The lever 46 operates on the side of a latch segment 48 and may be releasably retained in its different adjustments by a retaining pin 49 applied in a familiar manner.

After the fabric passes from the nap-raising mechanism above described the fabric is beaten to complete the desired effect and to remove any loose particles of lint, nap or other materials. A pulley 50 attached to the shaft 16 drives a belt 51 engaging a pulley 52 on a rotary shaft 53. The shaft 53 has a gear 54 rigid thereon meshing with a gear 55 rigid on a rotary shaft 56. These shafts 53 and 56 are parallel with the shafts 20 and 38 and each of said shafts supports a number of beater blades 57. The shafts 53 and 56 are rotated at greater speeds than the shafts 20 and 38 so that the beater blades 57 will function most efficiently to remove loose particles from the fabric passing between the beater rolls. The beater rolls on the respective shafts 53 and 56 extend between longitudinal series of spaced guides 58 so that the fabric cannot become wound about or entangled with either of the beater rolls. The blades 57 extend beyond the guides 58.

The detached particles of the fabrics, and other substances, are further removed therefrom by a suction device. As shown, the suction device comprises a blower 59 of any known or appropriate construction operated by a shaft 60 driven by the motor 13. The inlet pipe 61 to the blower has branches 62 extending in spaced relationship below the shafts 20 and 38 on which the nap-raising devices are supported and below and laterally from the beater rolls 53 and 56. Each of these branches is formed with an upwardly extended elongated suction inlet mouth 63 opening toward the outer surfaces of the nap-raising devices on the shafts 20 and 38, respectively, so that any particles adhering to said nap-raising devices will be withdrawn therefrom by the suction device. Each of the branches 62 also has a number of lateral inlet openings 64 (Fig. 1) opening toward the fabric passing from the beater rolls 53 and 56, so that any detached particles adhering to the fabric will be withdrawn. The blower 59 opens into a waste receptacle 65 (Fig. 3) into which the detached particles are discharged.

The fabric leaving the beater rolls passes onto an inclined table or chute 66 (Fig. 1) to the receptacle 4. In using the machine the lever 46 is set to place the shaft 38 at proper distance from the shaft 20 in order to adjust the nap-raising devices on said

shafts in proper relationship for the thickness of the materials to be passed through the machine. The motor is then started. Then the sheets of fabric are successively engaged with the carding brush 10 and the table 7 swung upwardly until its inner edge contacts with the work support and guide 6. The belt 31 pressing upon the sheet of fabric passes the fabric to the nap-raising devices on the shafts 20 and 38. Since the fabric is drawn across the carding brush 10 it is subjected to a brushing action. Since the shafts 20 and 38 are rotated at greater speed than the movement of the belt 31, it is apparent that the belt 31 functions as a fabric feed device and also as a retarder, so that the fabric will be subjected to brushing actions by the brushes 35 and 40. Leaving the nap-raising devices on the shafts 20 and 38, the fabric passes between the beater rolls 53 and 56 which are rotated somewhat faster than the shafts 20 and 38, thus removing most of the remaining loose particles from the fabric. Nearly all of the remaining loose particles will be removed from the fabric by the suction device and discharged into the waste receptacle 65.

From the foregoing it must be apparent that our invention obtains all of its intended objects and purposes in a highly efficient, satisfactory and simplified manner. The construction, arrangement and relationship of the different parts and devices may be varied within equivalent limits without departure from the nature and principle of the invention.

We do not restrict ourselves unessentially in these, or other respects, but what we claim and desire to secure by Letters Patent is:

1. A machine of the character described comprising a stationary support, a flexible actuator operative to move fabrics over said stationary support and between said actuator and said support, brushing rolls arranged to operate against the fabric passing between them from said stationary support, and mechanism for operating said brushing rolls at greater speed than said flexible actuator.

2. A machine of the character described comprising a stationary support, a flexible actuator operative to move fabrics over said stationary support and between said actuator and said support, brushing rolls arranged to operate against the fabric passing between them from said stationary support, mechanism for operating said brushing rolls at greater speed than said flexible actuator, and spaced beater rolls beyond said brushing rolls operative to beat the fabric passing between them from said brushing rolls.

3. A machine of the character described comprising a stationary support, a flexible actuator operative to move fabrics over said stationary support and between said

actuator and said support, brushing rolls arranged to operate against the fabric passing between them from said stationary support, mechanism for operating said brushing rolls at greater speed than said flexible actuator, and mechanism for withdrawing from said brushing rolls particles detached from the fabric.

4. A machine of the character described comprising a stationary support, a flexible actuator operative to move fabrics over said stationary support and between said actuator and said support, brushing rolls arranged to operate against the fabric passing between them from said stationary support, mechanism for operating said brushing rolls at greater speed than said flexible actuator, spaced beater rolls beyond said brushing rolls operative to beat the fabric passing between them from said brushing rolls, and mechanism for withdrawing from said brushing rolls particles detached from the fabric.

5. A machine of the character described comprising a stationary support, a pivoted table for supporting fabrics passing to said support, a brush on said table for engaging and holding fabrics, a flexible actuator for engaging the fabric on said table and moving the fabric from said table across said brush and thence across said support, a pair of rolls, rows of brushes on said rolls, radial bars on each of said rolls corresponding to the brushes on the other roll, and mechanism for operating said rolls and said actuator in a ratio in which said rolls are operated at greater speed than said actuator.

6. A machine of the character described comprising a stationary support, a pivoted table for supporting fabrics passing to said support, a brush on said table for engaging and holding fabrics, a flexible actuator for engaging the fabric on said table and moving the fabric from said table across said brush and thence across said support, a pair of rolls, rows of brushes on said rolls, radial bars on each of said rolls corresponding to the brushes on the other roll, mechanism for operating said rolls and said actuator in a ratio in which said rolls are operated at greater speed than said actuator, and mechanism for removing from said rolls detached particles of fabric and the like.

7. A machine of the character described comprising a stationary support, a pivoted table for supporting fabrics passing to said support, a brush on said table for engaging and holding fabrics, a flexible actuator for engaging the fabric on said table and moving the fabric from said table across said brush and thence across said support, a pair of rolls, rows of brushes on said rolls, radial bars on each of said rolls corresponding to the brushes on the other roll,

mechanism for operating said rolls and said actuator in a ratio in which said rolls are operated at greater speed than said actuator, and means beyond said rolls for removing from the fabric detached particles.

8. A machine of the character described comprising a pair of parallel brushing rolls, means for spacing said rolls different distances apart as required to operate upon fabrics of different thicknesses, an actuator for delivering fabric to said rolls, mechanism for operating said rolls and said actuator in a ratio in which said rolls move at greater speed than said actuator, and beater rolls for beating the fabric passing from said brushing rolls.

9. A machine of the character described comprising a pair of parallel brushing rolls, means for spacing said rolls different distances apart as required to operate upon fabrics of different thicknesses, an actuator for delivering fabric to said rolls, mechanism for operating said rolls and said actuator in a ratio in which said rolls move at greater speed than said actuator, beater rolls for beating the fabric passing from said brushing rolls, and mechanism for removing particles of detached fabric and other particles from the machine.

10. A machine of the character described comprising a stationary support, a flexible actuator operative to move fabric across said support, a pair of swinging arms, a table pivoted upon said arms and arranged to swing into and out of contact with said support, a carding brush attached to said table near the edge adjacent to said support for engaging and holding fabric in position for engagement by said actuator, and a pair of brushing rolls operating upon the fabric passing from said support.

11. A machine of the character described comprising a stationary support, a flexible actuator operative to move fabric across said support, a pair of swinging arms, a table pivoted upon said arms and arranged to swing into and out of contact with said support, a carding brush attached to said table near the edge adjacent to said support for engaging and holding fabric in position for engagement by said actuator, a pair of brushing rolls operating upon the fabric passing from said support, and a pair of beater rolls operating upon the fabric passing from said brushing rolls.

12. A machine of the character described comprising a pair of rolls, means for driving one of said rolls by the other, a series of radial bars attached to each of said rolls, a series of brushes attached to each of said rolls between said bars in a relationship in which the bars on one roll are brought opposite the brushes on the other roll when said rolls are rotated, and vice versa, and a pair of beater rolls rotating at greater speed

than said brushing rolls and operating upon the fabric passing from said brushing rolls.

13. A machine of the character described comprising a pair of brushing rolls, a device for actuating fabrics to said brushing rolls, a pair of beater rolls arranged to operate upon the fabrics passing from said brushing rolls, and mechanism for operating said brushing rolls, said actuator and said beating rolls in a ratio in which said brushing rolls rotate at greater speed than said actuator and said beater rolls rotate at greater speed than said brushing rolls.

14. A machine of the character described comprising a pair of horizontal brushing rolls arranged to operate against fabric passing downwardly between them, a stationary support above one of said rolls and having one edge approximately in the plane of the tangent to the rolls at their engaging lines and flexible actuator for moving fabric across and discharging said fabric from said stationary support for movement downwardly between said rolls.

15. A machine of the character described comprising a pair of horizontal brushing rolls arranged to operate against fabric passing downwardly between them, a support above one of said rolls having one edge approximately in the plane of the tangent to the rolls at their engaging lines, and flexible actuator for moving a fabric across said support and discharging said fabric downwardly across the inner edge of said support between said rolls.

16. A machine of the character described comprising a pair of horizontal brushing rolls arranged to operate against fabric passing downwardly between them, a stationary support above one of said rolls having one edge approximately in the plane of the tangent to the rolls at their engaging lines, a brush for engaging and holding fabric preparatory for movement of said fabric across said support, and means for engaging the fabric that is engaged by said brush and moving the fabric across said support and discharging the fabric downwardly from said support between said rolls.

17. A machine of the character described comprising a pair of horizontal brushing rolls arranged to operate against fabric passing downwardly between them, a stationary support above one of said rolls having one edge approximately in the plane of the tangent to the rolls at their engaging lines, a brush for engaging and holding fabric preparatory for movement of said fabric across said support, means for engaging the fabric that is engaged by said brush and moving the fabric across said support and discharging the fabric downwardly from said support between said rolls, mechanism for operating one of said rolls by the other, and mechanism for spacing said rolls different

distances apart as required to operate upon fabrics of different thicknesses.

18. A machine of the character described comprising a pair of horizontal brushing rolls arranged to operate against fabric passing downwardly between them, mechanism for moving fabric over one of said rolls and discharging the fabric downwardly between said rolls, a device for engaging and holding the front marginal portion of the fabric to be moved by said mechanism, and a movable support for moving said devices to position in which the front marginal portion of the fabric engaged by said device will be engaged by said mechanism.

19. A machine of the character described comprising, a pair of rolls, a series of radial bars attached to each of said rolls, a series of brushes attached to each of said rolls between said bars, and means for positively driving one of said rolls by the other in order to maintain between said rolls a relationship in which the bars on one roll are brought opposite the brushes on the other roll when said rolls are rotated and vice versa.

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