March 10, 1959 F. M. BURESH ET AL 2,876,500

MACHINE FOR FIBER CLEANING

Filed Aug. 26, 1954

3 Sheets-Sheet 1

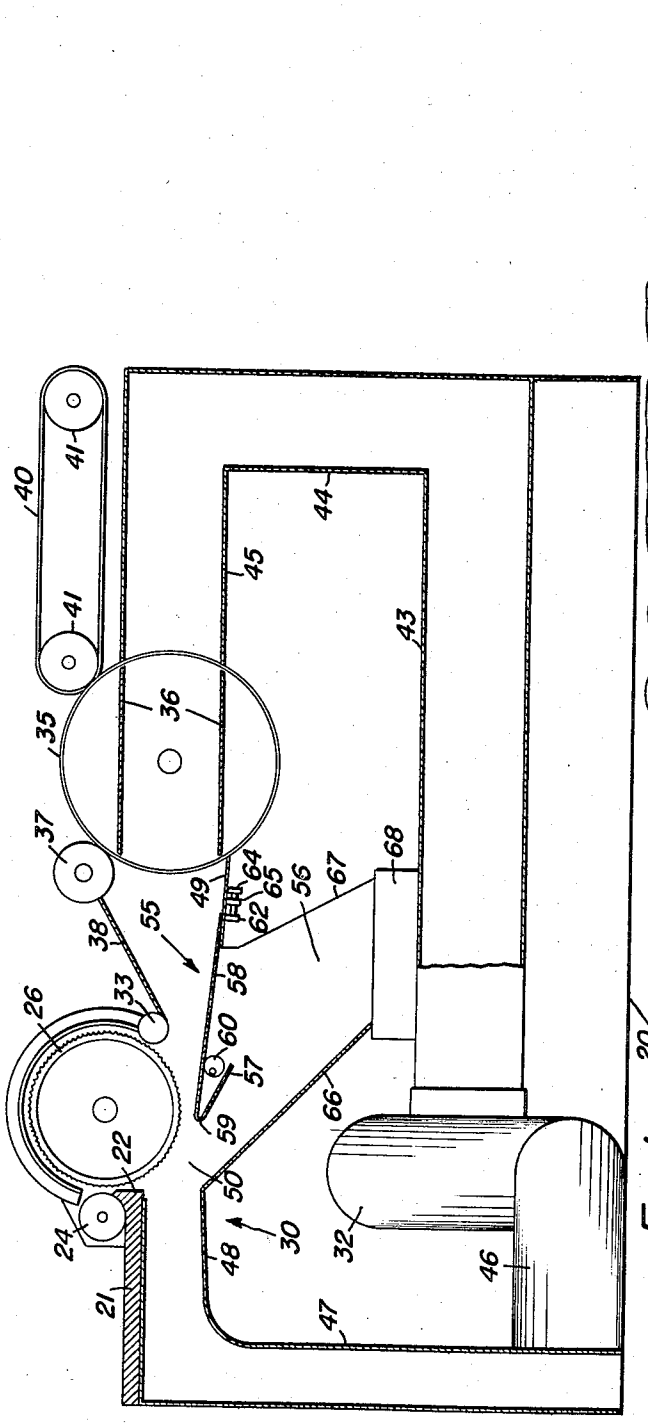


FIG. 1.

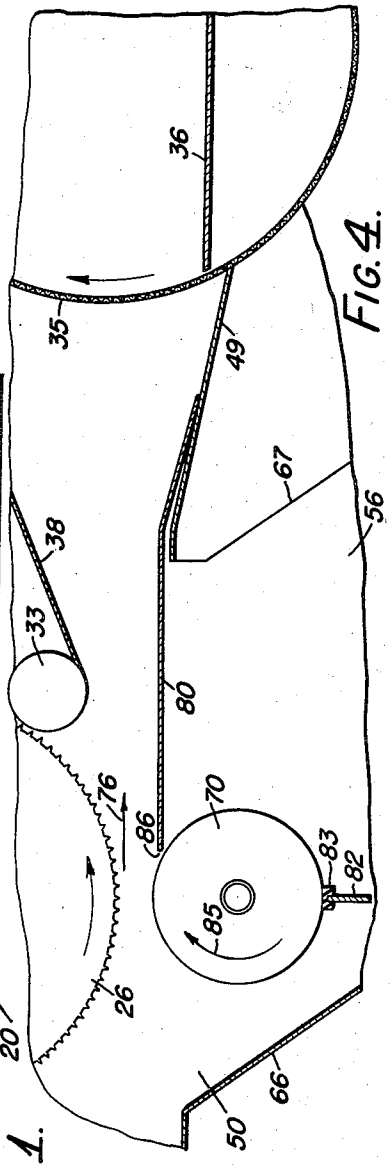


FIG. 4.

INVENTORS.
FRANCIS M. BURESH
AND HOWARD H. LANGDON
BY
ATTORNEY

March 10, 1959 F. M. BURESH ET AL 2,876,500

MACHINE FOR FIBER CLEANING

Filed Aug. 26, 1954

3 Sheets-Sheet 2

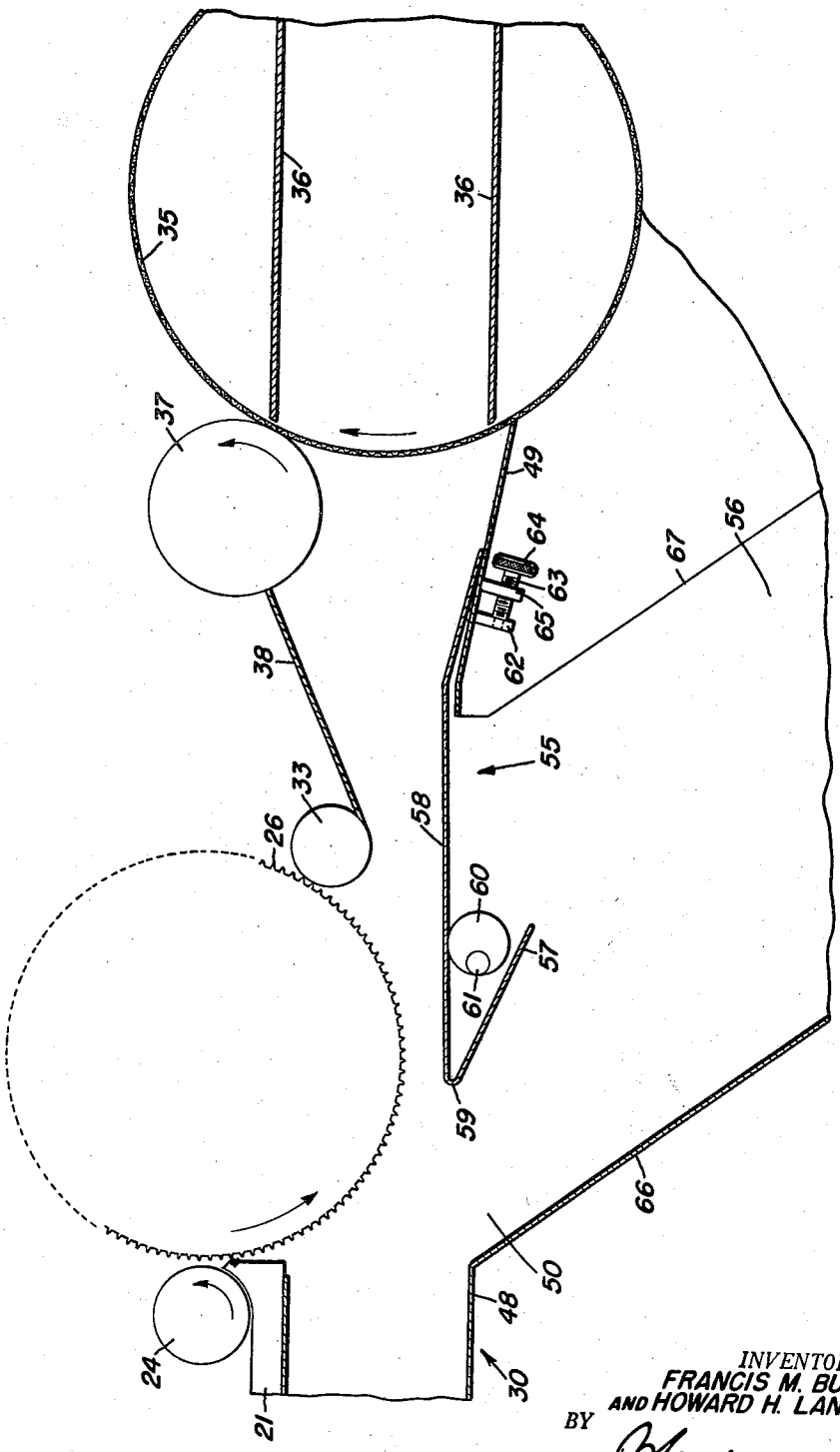


FIG. 2.

INVENTORS:
FRANCIS M. BURESH
AND HOWARD H. LANGDON
BY
ATTORNEY

March 10, 1959 F. M. BURESH ET AL 2,876,500

MACHINE FOR FIBER CLEANING

Filed Aug. 26, 1954

3 Sheets-Sheet 3

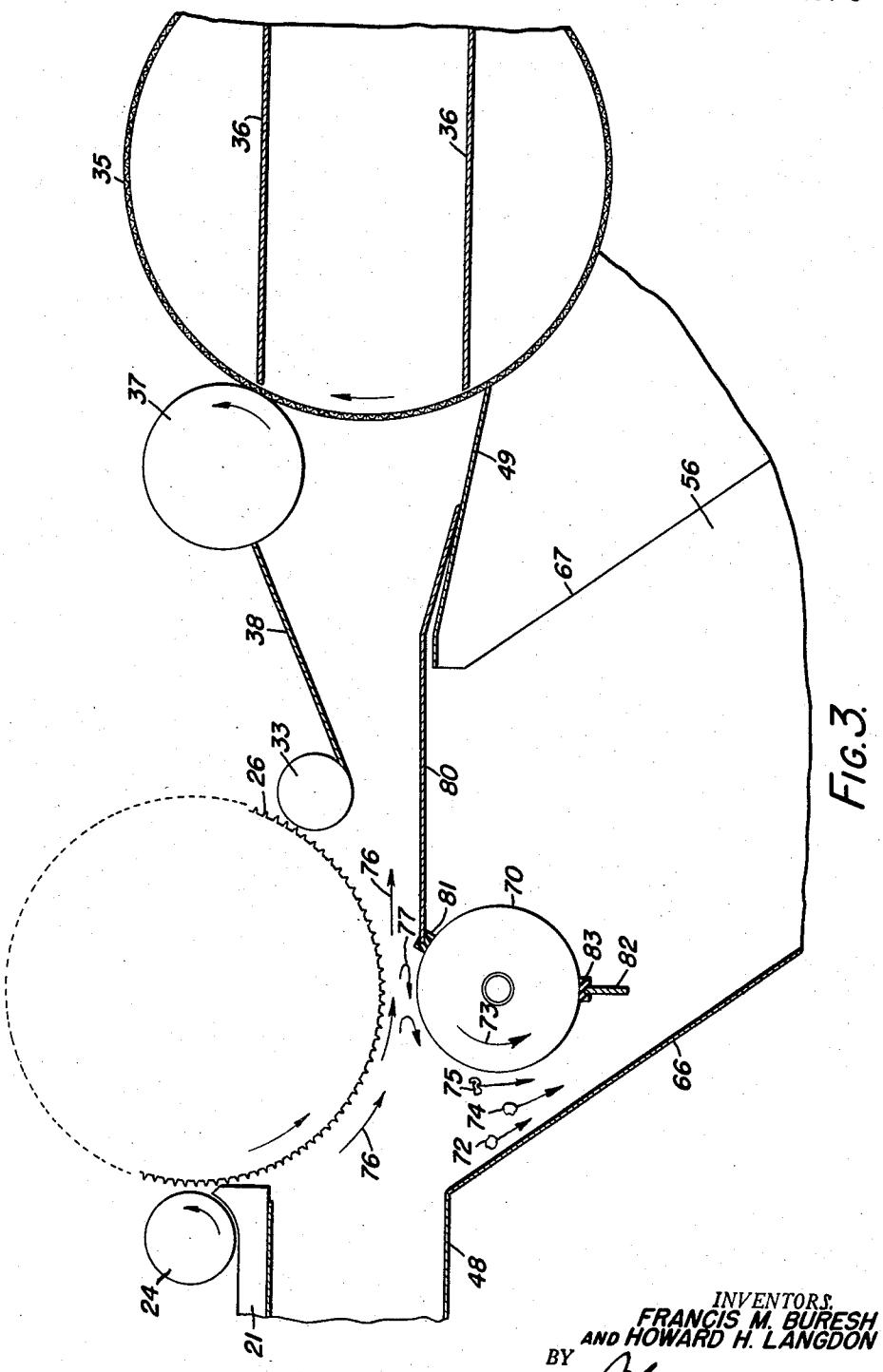


FIG. 3.

INVENTORS.
FRANCIS M. BURESH
AND HOWARD H. LANGDON
BY
ATTORNEY

United States Patent Office

2,876,500

Patented Mar. 10, 1959

2,876,500

MACHINE FOR FIBER CLEANING

Francis M. Buresh, Brighton, and Howard H. Langdon, Rochester, N. Y., assignors to Curlator Corporation, East Rochester, N. Y., a corporation of New York

Application August 26, 1954, Serial No. 452,324

15 Claims. (Cl. 19—89)

The present invention relates to a method and to apparatus for opening and cleaning fibrous materials and more particularly to a method and apparatus for removing trash from raw cotton, cotton bats, and the like. In a more specific aspect the invention relates to a modification of a machine of the general type disclosed in the Buresh U. S. Patent No. 2,451,915, granted October 19, 1948, and in the Buresh et al. U. S. patent application Serial No. 26,256, filed May 11, 1948, now Patent No. 2,700,188, granted January 25, 1955, and in the Langdon et al. U. S. patent application, Serial No. 415,206, filed March 10, 1954, for the purpose of opening and cleaning fibrous materials.

It is well known to blow or beat raw cotton in an open condition over or against sieves or grids in an effort to remove dirt and trash therefrom, but, if the openings of the sieves or grids are small enough so that practically all the wanted material is retained, a large proportion of the trash will also be retained, whereas, if the openings are large enough to permit a large proportion of the trash to pass therethrough, a portion of the wanted material will also pass therethrough and be wasted. Furthermore, the sieves or grids increase the turbulence of the air current, and even if trash passes through it is frequently drawn or blown back, and wanted material is frequently blown through the sieve or grid thereby going to waste.

The primary object of the present invention is to provide apparatus for more efficiently cleaning fibrous materials, such as raw cotton and cotton bats, etc.

Another object of the invention is to provide apparatus of the character described which will permit of close control of the separation of the trash from the cotton, or other fibrous material, so as to prevent discard of good fibers.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claims.

In the drawings:

Fig. 1 is a vertical section taken longitudinally through a machine built according to one embodiment of this invention;

Fig. 2 is an enlarged fragmentary vertical section illustrating more particularly the airfoil mounting in this machine;

Fig. 3 is a fragmentary vertical section on an enlarged scale showing a modified construction; and

Fig. 4 is a fragmentary vertical section showing a still further modification of the invention.

Referring now to the drawings by numerals of reference, and first to the embodiment of the invention shown in Figs. 1 and 2, 20 indicates the base or frame of the machine. This may be made of fabricated steel with suitable reinforcement and is generally rectangular in shape. This machine is similar in construction to the machine of Patent No. 2,700,188 above mentioned. Secured to the upper face of the frame 20 is a feed plate

21 which is a flat horizontal plate having a smooth upper surface and which is formed at its right hand end with a toothed nose or riser portion 22. Mounted above the feed plate 21 to cooperate with the nose portion thereof is a knurled feed roll 24.

Mounted adjacent the toothed nose portion 22 of the feed plate, to comb fibers out of the material fed over the nose bar by the feed roll, is a toothed lickerin 26. It is provided with a plurality of peripheral teeth which may be similar to saw teeth.

As the lickerin revolves, its teeth pick fibers from the stock being fed to it by the feed roller 24; and it carries these fibers around into an air duct 30 into which the lickerin projects at its bottom. A high velocity air stream circulates in this duct through operation of a fan 32, as will be described hereinafter. Hence the fibers are doffed from the lickerin by the suction of this air stream and by the centrifugal force created by the high speed rotation of the lickerin itself. A doffing bar 33 cooperates with the lickerin to assist in the doffing of the fibers therefrom.

The fibers carried in the air stream are delivered to a rotating condenser 35 which is made of wire mesh or of any other suitable reticulated material. The air duct extends diametrally through this condenser, being bounded within the condenser by the upper and lower, parallel, stationary plates 36. The fibers deposited in random fashion on the condenser 35 by the high velocity air stream flowing through the condenser are pressed thereagainst by a web roll 37 which may be driven in time with the condenser. A plate 38 extending between doffing bar 33 and web roll 37 serves to close this portion of the air duct at its top.

Adjacent the top of the condenser is an endless conveyor belt 40 which is trained about two supporting rollers 41 that are suitably supported from the frame of the machine. One of these rollers may be positively driven at the same surface speed as the condenser. The random web formed on the condenser is delivered onto the conveyor belt 40 which serves to convey it to the discharge point of the machine.

The inlet side of the fan 32 connects with a horizontal section 43 of the air duct. This, in turn, connects with a vertical section 44 of the air duct, and this in turn connects with a horizontal portion 45 of the duct. Portion 45 of the duct communicates with the section of the duct formed by the plates 36. Portion 45 and plates 36 have air tight connections externally and internally, respectively, with the rotary condenser 35. The upper wall of the duct section 45 and the right hand outside wall of the duct section 44 are portions of the top and right hand side walls, respectively, of the machine.

The fan 32 is connected on its pressure side with a section 46 of the air duct which, in turn, connects at its left hand end with the vertical portion 47 of the air duct. Section 47 is curved at its upper end and joins horizontal duct section 48. The left hand outside wall of duct section 47 is the left hand side wall of the machine, while the upper wall of duct section 48 is the upper wall of the frame of the machine.

The duct 30 is like that used in the machines disclosed in Patent No. 2,700,188 and application Serial No. 415,206 except that there is a gap in the lower side of its upper horizontal reach as denoted at 50. Adjustably mounted below the lickerin is an air foil 55. This air foil is adjustable across the gap 50 and controls the opening between the main air duct 30 and a chamber 56 which is adapted to receive trash.

The air foil 55 is a smooth surfaced plate which extends across the full width of the main air duct 30 and which forms part of the lower wall thereof. It is bent

underneath itself at its left hand end, as shown in Fig. 2 so as to have a reversely bent portion 57 which is inclined at an acuate angle to the main portion 58 of the air foil.

The air foil is supported at its left hand end upon an eccentric 60 which is secured to a shaft 61 that is rotatable in the frame of the machine for effecting adjustment of the eccentric. The air foil has a lug 62 secured to its adjacent its right hand end, which extends downwardly through an opening in the duct. A screw 63 having a knurled head 64 engages the lug 62 to effect horizontal adjustment of the air foil. This screw threads into a lug 65 that depends from the portion of the air duct. Rotation of the eccentric 60 effects vertical adjustment of the air foil; and rotation of the knurled head 64 of screw 63 effects horizontal adjustment of the air foil. In this way the width of the gap 50 in the duct may be adjusted, and also the space between the air foil and the lickerin.

The air foil may be adjusted, as shown, so that it forms with the lickerin a venturi-like section whose narrowest portion is approximately opposite the lickerin. Thus, despite the use of an air foil, maximum velocity of the air stream may be attained opposite a portion of the lickerin and there will be a differential in air speed in duct 30 opposite the opening 50 from the air speed attained in the narrow neck between air foil 55 and the lickerin. This differential in speed, which also means a differential in air pressure, causes separation of the trash from the good fibers. The heavier trash, which is thrown off first by the lickerin, can readily drop out of the air stream where the rate of air travel is low, namely, in the portion of the duct opposite opening 50, while the good fibers, which are lighter and therefore doffed last by the lickerin, are thrown off in the venturi-like section of the duct and carried on to the condenser 35.

The chamber 56 has downwardly converging walls 66 and 67; and at its bottom it has a suitable trash collecting and removal means 68 such as a belt or screw conveyor or a rotary condenser connected by a duct to the suction side of fan 32.

In operation, the cotton, or other fibrous material to be cleaned is fed at controlled rate by the feed roller 24 to the rapidly revolving lickerin 26 which is rotating at a speed of say 2300 R. P. M. The teeth of the rapidly rotating lickerin comb the fibrous material and open it up, projecting small tufts or individual fibers of the material and trash into the air stream. The opening at 50 in the bottom of the duct provides with chamber 56 a large free space into which the air can flow, and the speed of flow of air decelerates considerably, therefore, at opening 50 which is opposite the discharge portion of the lickerin. The trash particles, which are heavier than the fibers, or fiber tufts, fall out of the main air stream into chamber 56, while the fibers, or fiber tufts, which are more buoyant, follow the main air flow. Where the air foil approaches closest to the lickerin, the speed of the air flow increases rapidly again because of the venturi effect. Thus the floating fibers, or fiber tufts, are carried away rapidly from the area of separation of fibers and trash. This aids in effecting the desired separation.

Adjustment of the position of the rounded nose 59 of the air foil permits of control of the percentage of trash "throw-out" when cleaning cotton or other fibers. The air foil helps separate the heavier particles of trash, which are thrown off first and farthest by the lickerin, from the lighter fibers or fiber tufts which are doffed only when subjected to greater centrifugal force and greater airstream stripping, and which because of their light weight are traveling close to the lickerin.

The velocity of the air stream is so regulated that the wanted fibrous material is carried through the space between the lickerin and the air foil onto the condenser without loss, but particles of less buoyancy fall or are flung out from the air stream into the receptacle 56. The cleaned fiber is deposited in random fashion on the foraminous condenser 35 by the high velocity air stream.

The chamber 56 is constructed so that air is not permitted to enter it except through the opening 50 between the nose 59 of the air foil and the opposed wall 66 of the settling or removal chamber. The trash falling to the bottom of chamber 56 may be removed by an endless conveyor, a conveying worm or the like, or by a rotary condenser, similar to condenser 35, for continuous disposal; or it may be collected in a tray for periodic disposal. If a rotary condenser is used for collecting the trash it may be connected to suction duct 43.

Instead of using an air foil, a rotor 70 may be employed to separate the trash from the good fibers as shown in Fig. 3. This rotor is mounted beneath the lickerin to be adjustable vertically and horizontally and in the direction of its rotation, and in the speed of its rotation.

It is an accepted fact in hydroynamics and aerodynamics that in a closed conductor, a moving fluid will exert less pressure on the walls of the conductor if its velocity is increased, assuming the mass of fluid to be contant. It is also well known in aerodynamics that a rotor rotating with a high surface speed is surrounded by a bound layer of the air or other medium, in which it rotates, the inner layer of air or other medium rotating at the same surface speed as the rotor while in successive outer layers of the air or other medium the rotating velocity diminishes as related to the surface speed of the rotor. The higher the rotor speed, the greater the depth of the bound layer, and the more effective it becomes in modifying the adjacent stream flow pattern. If a rotor is inserted in the conductor, with its axis perpendicular to the fluid flow, it will affect the velocity of the fluid stream. On one side of the rotor its surface will be moving in the same direction as the fluid flow. On the opposite side it will be in the opposite direction of the fluid flow. The result of this is that on one side, the rotor will increase the velocity of the fluid flow, whereas on the other side where the force of the rotor opposes the fluid flow, the rotor will retard the fluid flow. This variation in velocity on the two sides of the rotor results in a variation in pressure. The higher pressure on one side will cause more fluid particles to move to the lower pressure side. The pressure will vary in direct proportion to the surface speed of the rotor. The rotor then becomes a mechanism for selectively dividing an air stream. By varying its speed of rotation it can be made to throw a selective amount of air on the side of the lower pressure.

As the mixture of trash and fiber leaves the teeth of the lickerin, due to the difference in density, the heavier trash particles will leave the teeth of the lickerin more quickly, and will be less affected by the high velocity air stream or bound layer adjacent the lickerin. They will readily fall into the chamber 56. The rotor 70 rotating in the direction of arrow 73 (Fig. 3) will cause air to flow into the space along the left hand wall 66 of chamber 56 where the pressure is low; and this will carry the heavy fiber trash 72, the lighter fiber trash, seeds, hulls, and lint, such as denoted at 74, and the neps, such as denoted at 75, down into the settling chamber. The rotor will operate even to turn back any neps or light trash that may have been doffed by the rotor late enough to get into the venturi section of the air duct, because the air flow adjacent the rotor will be counter to the air flow in the duct itself. Arrows 77 indicate how the rotor will turn back this trash and carry it into chamber 56. It is only the light clean fibers, whose centrifugal force, after being doffed by the lickerin, is small enough to keep them in the air stream or bound layer close to the lickerin, which are subsequently subject to doffing bar action and which travel on to the condenser, as denoted by arrows 76. The rotor, therefore, improves the separation, and by adjustment of its speed and position gives

complete, precise control over separation of the trash from the cotton or other fibers.

The rotor may be smooth-surfaced, fluted, or wire covered depending on the material being cleaned.

A divider plate **80** is mounted across the top of the settling chamber **56** beneath the lickerin and between the rotor **70** and the lower wall **49** of the air duct. A seal **81** may be provided between this divider plate and the rotor. This divider plate forms a portion of the bottom wall of the duct. A barrier **82** may be mounted in chamber **56** beneath the rotor to prevent travel of the air around the rotor. A seal **83** is provided between the barrier and the rotor to force the air to travel down beneath the barrier and thus aid in effecting the trash separation. This barrier may be located angularly at different positions as needed to influence the zone of trash separation.

If desired, the divider plate may be spaced from the rotor as shown in Fig. 4, and the direction **85** of rotation of the rotor **70** may be reversed as compared with Fig. 3. With this arrangement, the heavier trash, which is thrown off by the lickerin, will drop, as before, through opening **50** between the rotor and the left hand wall **66** of chamber **56** into the relatively quiescent body of air in the chamber **56**, while the lighter trash, which may be carried further by the lickerin and not doffed until the lickerin is travelling in the venturi section of the air duct between the lickerin and the rotor, will be carried in the air current or bound layer created by the rotor through the opening **86** between the left hand end of plate **80** and the rotor into chamber **56**. These lighter trash particles will be heavier than the good fibers and therefore will travel radially farther from the lickerin by centrifugal force. They will, therefore, be caught in the air stream created by the rotor and will enter chamber **56** through opening **86**, whereas the good particles will be carried on to condenser **35** by the main air stream as denoted by arrow **76**.

As already stated rotor **70** is mounted to be adjustable horizontally and vertically to control the depth of the venturi section of the main air duct **30** and also the width of opening **50**. Plate **80** is also mounted to be adjustable horizontally and vertically and these adjustments may be effected by the same means as shown in Fig. 2. The rotor **70** can be driven in either direction and at different speeds. Lickerin **26** and condenser **35** may be driven by means such as shown in Patent 2,700,188 and application No. 415,206 above mentioned; and the rotor **70** may be geared to the lickerin to rotate in time therewith, or may be driven by separate drive means, if desired.

While the invention has been described in connection with several different embodiments thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth and as fall within the scope of the invention or the limits of the appended claims.

Having thus described our invention, what we claim is:

1. A machine for cleaning fibrous material comprising a frame, a feed plate mounted on said frame, a rotary feed roll for feeding fibrous stock material over said plate, a lickerin rotatably mounted in said frame adjacent said feed plate to comb fibers out of the stock material fed over said plate by said feed roll, an air duct having a horizontally disposed portion extending laterally to both sides of the lickerin and beneath said plate and having upper and lower walls, said lickerin being disposed to project into said air duct through the upper wall thereof, a settling chamber communicating with said air duct through an opening in said duct opposite said lickerin, said settling chamber having walls extending angularly downwardly from said air duct in the direction of air flow, a condenser movably mounted in said frame and passing through said duct at a point spaced from the lickerin in the direction of air flow, means for effecting flow of air in said duct successively beneath said plate, over said opening, beneath said lickerin, and through said condenser, and a plate mounted across said opening opposite said lickerin to divide the air stream flowing through said duct, said plate forming part of the lower wall of said duct and being closer to said lickerin than the portions of the upper and lower walls of the duct, which are at opposite ends of said plate in the direction of air flow, are to each other whereby said plate forms with the lickerin a venturi section in said duct, and means for adjusting said plate toward and away from said lickerin and laterally with reference thereto to control the area of said opening and also of said venturi section.

2. A machine for cleaning fibrous material comprising a frame, a lickerin rotatably mounted in said frame, means for feeding stock material to said lickerin, an air duct having a horizontally disposed portion extending laterally to both sides of the lickerin and having upper and lower walls, said lickerin being disposed to project into said air duct through the upper wall thereof, a settling chamber communicating with said air duct through an opening in said duct opposite said lickerin, said settling chamber having walls extending angularly downwardly from said air duct, means for effecting flow of air in said duct, and a rotor rotatably mounted in said opening opposite said lickerin to divide the air stream flowing through said duct, and means for rotating said lickerin and said rotor, said rotor being closer to said lickerin than the portions of the upper and lower walls of the duct, which are at opposite sides of the rotor in the direction of air flow, are to each other, whereby said rotor forms with said lickerin a venturi section in said duct.

3. A machine for cleaning fibrous material comprising a frame, a lickerin rotatably mounted in said frame, means for feeding stock material to said lickerin, an air duct having upper and lower walls and extending laterally to both sides of said lickerin, said lickerin being disposed to project into said air duct through the upper wall thereof, a settling chamber communicating with said air duct through an opening in said duct opposite said lickerin, means for effecting flow of air through said duct, a rotor disposed in said opening, said rotor being positioned close to said lickerin to form with said lickerin a venturi section in said duct, a movable foraminous condenser intersecting and passing through said duct at a point spaced from said lickerin in the direction of air flow, and means for rotating said lickerin and said rotor and for effective movement of said condenser.

4. A machine for cleaning fibrous material comprising a frame, a lickerin rotatably mounted in said frame, means for feeding stock material to said lickerin, an air duct having upper and lower walls and extending laterally to both sides of said lickerin, said lickerin being disposed to project into said air duct through the upper wall thereof, a settling chamber communicating with said air duct through an opening in said duct opposite said lickerin, means for effecting flow of air through said duct, a rotor disposed in said opening, said rotor being positioned close to said lickerin to form with said lickerin a venturi section in said duct, a movable foraminous condenser intersecting and passing through said duct at a point spaced from said lickerin in the direction of air flow, means for rotating said rotor in a direction opposite to the direction of air flow, and means for rotating said lickerin and for effecting movement of said condenser.

5. A machine for cleaning fibrous material comprising a frame, a lickerin rotatably mounted in said frame,

means for feeding stock material to said lickerin, an air duct having upper and lower walls and extending laterally to both sides of said lickerin, said lickerin being disposed to project into said air duct through the upper wall thereof, a settling chamber communicating with said air duct through an opening in said duct opposite said lickerin, means for effecting flow of air through said duct, a rotor disposed in said opening, said rotor being positioned close to said lickerin to form with said lickerin a venturi section in said duct, a movable foraminous condenser intersecting and passing through said duct at a point spaced from said lickerin in the direction of air flow, means for rotating said rotor in the direction of air flow, and means for rotating said lickerin and for effecting movement of said condenser.

6. A machine for cleaning fibrous material comprising a frame, a lickerin rotatably mounted in said frame, means for feeding stock material to said lickerin, an air duct having upper and lower walls and extending laterally to both sides of said lickerin, said lickerin being disposed to project into said air duct through the upper wall thereof, a settling chamber communicating with said air duct through an opening in said duct opposite said lickerin, means for effecting flow of air through said duct, a rotor disposed opposite said lickerin and adjacent the entering side of said chamber to close part of said opening, a plate mounted in said duct to extend toward said rotor from the opposite side of said chamber to close another part of said opening, a movable foraminous condenser intersecting and passing through said duct at a point spaced from said lickerin in the direction of air flow, and means for rotating said lickerin and said rotor and for effecting movement of said condenser.

7. A machine for cleaning fibrous material comprising a frame, a lickerin rotatably mounted in said frame, means for feeding stock material to said lickerin, an air duct having upper and lower walls and extending laterally to both sides of said lickerin, said lickerin being disposed to project into said air duct through the upper wall thereof, a settling chamber communicating with said air duct through an opening in said duct opposite said lickerin, means for effecting flow of air through said duct, a rotor disposed opposite said lickerin and adjacent the entering side of said chamber to close part of said opening, a plate mounted in said duct to extend toward said rotor from the opposite side of said chamber to close another part of said opening, a movable foraminous condenser intersecting and passing through said duct at a point spaced from said lickerin in the direction of air flow, and means for rotating said lickerin, means for rotating said rotor in a direction opposite to the direction of air flow, means for effecting movement of said condenser, and means for sealing the space between said plate and said rotor, said rotor and plate together extending across part of said opening only.

8. A machine for cleaning fibrous material comprising a frame, a lickerin rotatably mounted in said frame, means for feeding stock material to said lickerin, an air duct having upper and lower walls and extending laterally to both sides of said lickerin, said lickerin being disposed to project into said air duct through the upper wall thereof, a settling chamber communicating with said air duct through an opening in said duct opposite said lickerin, means for effecting flow of air through said duct, a rotor disposed opposite said lickerin and adjacent the entering side of said chamber to close part of said opening, a plate mounted in said duct to extend toward said rotor from the opposite side of said chamber to close another part of said opening, a movable foraminous condenser intersecting and passing through said duct at a point spaced from said lickerin in the direction of air flow, and means for rotating said lickerin, means for rotating said rotor in the direction of air flow, means for effecting movement of said condenser, said rotor being spaced from said plate but the distance between said rotor and said plate being less than the distance between said rotor and the adjacent entering side of said chamber.

9. A machine for cleaning fibrous material comprising a frame, a lickerin rotatably mounted in said frame, means for feeding stock material to said lickerin, an air duct having upper and lower walls and extending laterally to both sides of said lickerin, said lickerin being disposed to project into said air duct through the upper wall thereof, a settling chamber communicating with said air duct through an opening in said duct opposite said lickerin, means for effecting flow of air through said duct, a rotor disposed opposite said lickerin and adjacent the entering side of said chamber to close part of said opening, a plate mounted in said duct to extend toward said rotor from the opposite side of said chamber to close another part of said opening, a movable foraminous condenser intersecting and passing through said duct at a point spaced from said lickerin in the direction of air flow, and means for rotating said lickerin and said rotor and for effecting movement of said condenser, a barrier mounted beneath said rotor and extending approximately radially thereof into said chamber, and means for sealing the space between said barrier and said rotor.

10. The method of cleaning fibrous material which comprises doffing said material by centrifugal force from a rotary lickerin into an air stream, while passing said air stream successively over a relatively large, substantially quiescent body of air that communicates with said air stream and through a confined space, whereby successively to decelerate and accelerate the rate of flow of said air stream, so that heavier particles carried by said lickerin are doffed from said lickerin and settle into said quiescent body of air, and the lighter particles are doffed from said lickerin into the accelerated air flow, and augmenting the separating effect of the quiescent body of air and of said accelerated air flow by rotating a rotor in said air stream about an axis transverse to the direction of air flow.

11. The method of cleaning fibrous material which comprises doffing said material by centrifugal force from a rotary lickerin into an air stream, while passing said air stream successively over a relatively large, substantially quiescent body of air that communicates with said air stream and through a confined space, whereby successively to decelerate and accelerate the rate of flow of said air stream, so that heavier particles carried by said lickerin are doffed from said lickerin and settle into said quiescent body of air, and the lighter particles are doffed from said lickerin into the accelerated air flow, and augmenting the separating effect of the quiescent body of air and of said accelerated air flow by rotating a rotor in said air stream about an axis transverse to the direction of air flow and in a direction opposite to the direction of air flow.

12. The method of cleaning fibrous material which comprises doffing said material by centrifugal force from a rotary lickerin into an air stream, while passing said air stream successively over a relatively large, substantially quiescent body of air that communicates with said air stream and through a confined space, whereby successively to decelerate and accelerate the rate of flow of said air stream, so that heavier particles carried by said lickerin are doffed from said lickerin and settle into said quiescent body of air, and the lighter particles are doffed from said lickerin into the accelerated air flow, and augmenting the separating effect of the quiescent body of air and of said accelerated air flow by rotating a rotor in said air stream about an axis transverse to the direction of air flow and in the direction of air flow, and providing space at both sides of said rotor whereby air and heavy particles may settle into said quiescent body of air around both sides of said rotor.

13. A machine for cleaning fibrous material comprising a frame, a feed plate mounted on said frame, a rotary feed roll for feeding fibrous stock material over

said plate, a lickerin rotatably mounted in said frame adjacent said feed plate to comb fibers out of said stock material as said material is fed over said plate by said feed roll, an air duct in said frame extending beneath said plate and beneath said lickerin, said air duct having top, bottom and side walls, said lickerin projecting through the top wall of said duct into said duct to narrow the depth of said duct where the lickerin projects into the same and to provide a venturi effect in said duct opposite said lickerin, a condenser movably mounted in said frame and passing through said duct at a point spaced from the lickerin in the direction of air flow, means for sucking air successively through said duct beneath said plate and between said lickerin and the bottom of said duct and through said condenser, a settling chamber disposed beneath said duct, the bottom wall of said duct having an opening therein communicating with said chamber, the leading edge of said opening being approximately beneath the point where the rotating lickerin combs the fibers out of said stock material, the bottom wall of said duct including a member which is adjustable to control the width of said opening in the direction of air flow in said duct.

14. A machine for cleaning fibrous material comprising a frame, a feed plate mounted on said frame, a rotary feed roll for feeding fibrous stock material over said plate, a lickerin rotatably mounted in said frame adjacent said feed plate to comb fibers out of said stock material as said material is fed over said plate by said feed roll, an air duct in said frame extending beneath said plate and beneath said lickerin, said air duct having top, bottom and side walls, said lickerin projecting through the top wall of said duct into said duct to narrow the depth of said duct where the lickerin projects into the same and to provide a venturi effect in said duct opposite said lickerin, a condenser movably mounted in said frame and passing through said duct at a point spaced from the lickerin in the direction of air flow, means for sucking air successively through said duct beneath said plate and between said lickerin and the bottom of said duct and through said condenser, a settling chamber disposed beneath said duct, the bottom wall of said duct having an opening therein communicating with said chamber, the leading edge of said opening being approximately beneath the point where the rotating lickerin combs the fibers out of said stock material, the bottom

wall of said duct including a member which is adjustable toward and away from said lickerin and also across said opening to control the distance between said lickerin and the bottom wall of said duct and also the width of said opening in the direction of air flow in said duct.

15. A machine for cleaning fibrous material comprising a frame, a feed plate mounted on said frame, a rotary feed roll for feeding fibrous stock material over said plate, a lickerin rotatably mounted in said frame adjacent said feed plate to comb fibers out of said stock material as said material is fed over said plate by said feed roll, an air duct in said frame extending beneath said plate and beneath said lickerin, said air duct having top, bottom and side walls, said lickerin projecting through the top wall of said duct into said duct to narrow the depth of said duct where the lickerin projects into the same and to provide a venturi effect in said duct opposite said lickerin, a condenser movably mounted in said frame and passing through said duct at a point spaced from the lickerin in the direction of air flow, means for sucking air successively through said duct beneath said plate and between said lickerin and the bottom of said duct and through said condenser, a settling chamber disposed beneath said duct, the bottom wall of said duct having an opening therein communicating with said chamber, the leading edge of said opening being approximately beneath the point where the rotating lickerin combs the fibers out of said stock material, the bottom wall of said duct including a plate which is adjustable in said frame to be adjustable horizontally and vertically to vary the width of said opening in the direction of air flow in said duct and also the distance between said lickerin and the bottom wall of said duct.

References Cited in the file of this patent

UNITED STATES PATENTS

347,382	Risler	Aug. 17, 1886
535,976	Campbell	Mar. 19, 1895
2,062,626	Williams et al.	Dec. 1, 1936
2,451,915	Buresh	Oct. 19, 1948
2,726,423	Harwood et al.	Dec. 13, 1955
2,755,513	Fleissner	July 24, 1956

FOREIGN PATENTS

255,285	Great Britain	July 22, 1926