June 2, 1942. J. T. LANDRETH 2,284,750

DELINTING WASTE PULLER

Filed May 7, 1941 2 Sheets-Sheet 1

Fig. 1

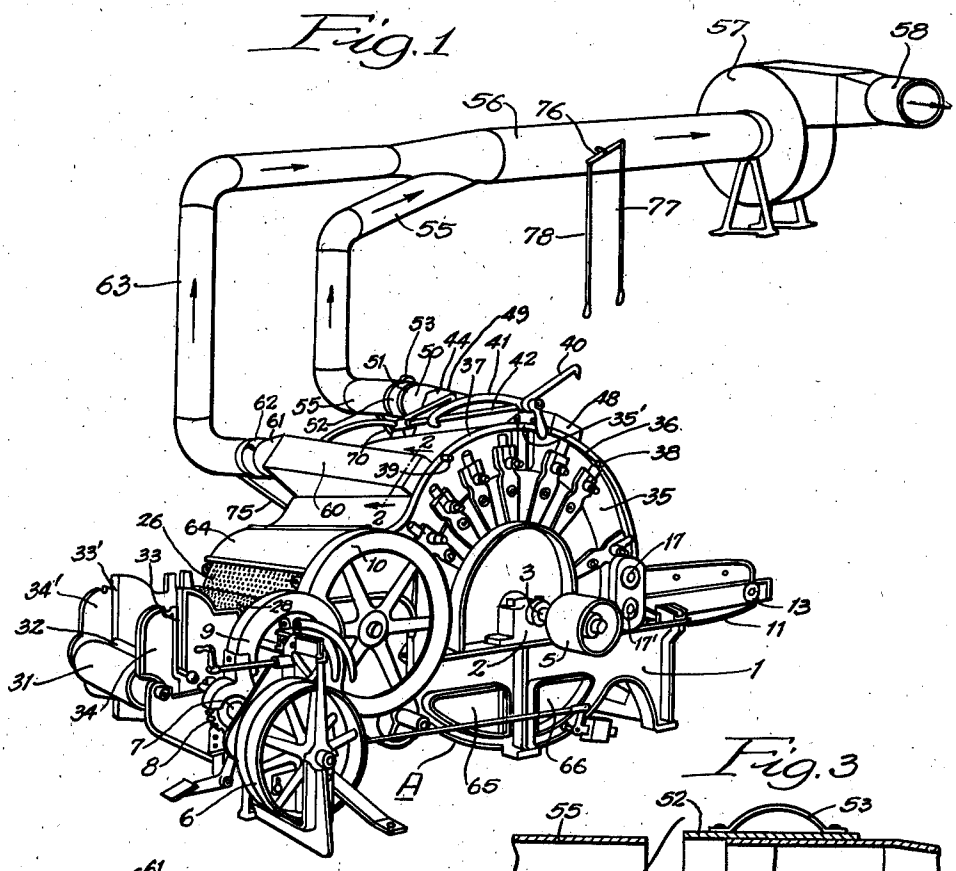


Fig. 3

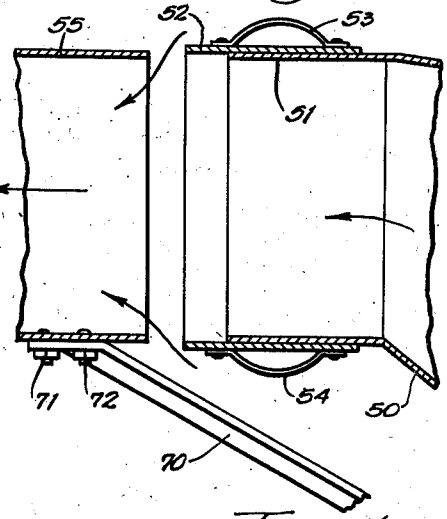
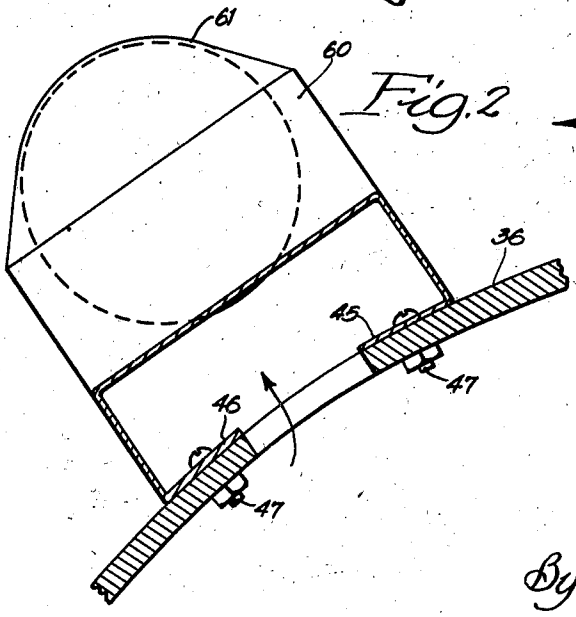


Fig. 2



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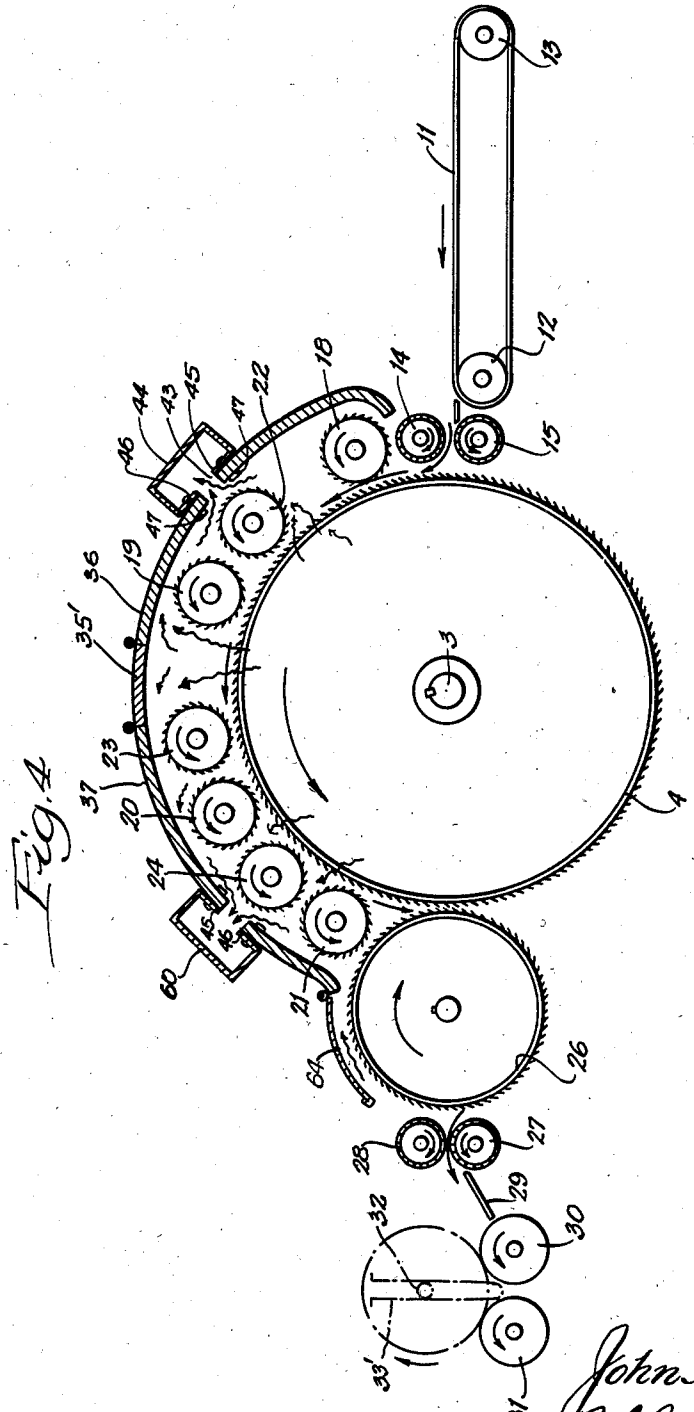


Fig. 4

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Patented June 2, 1942

2,284,750

UNITED STATES PATENT OFFICE

2,284,750

DELINTING WASTE PULLER

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Application May 7, 1941, Serial No. 392,307

3 Claims. (Cl. 19—83)

The present invention relates to a waste puller, and is particularly concerned with the provision of a waste puller which removes the lint at approximately the points and the instants of its creation.

A waste puller customarily comprises a central main drum studded with teeth or pins throughout its periphery, with which is associated a plurality of smaller pin-studded rolls to pull, shred and comb material fed to the machine.

The drum and rolls are arranged and connected by suitable drive mechanisms to act upon an indiscriminately mixed and tangled mass of thread, yarn, string, etc. which is fed into the machine, so as to arrange the fibrous strands to extend generally parallel to each other, and at right angles to the axes of the rolls. The commercial waste thus produced is discharged from between delivery rolls at the discharge end of the machine where the waste may be rolled upon a suitable mandrel into rolls of a required size, or may be removed in an unrolled state directly from the delivery rolls and placed in suitable baskets or other suitable containers. The latter procedure resulting in what is termed "unfleeced" waste is preferred where the product is to be used for railway journal box packing.

Waste of this general character has been produced by machines of the type referred to for many years, and for most of the ordinary purposes for which this type of waste is used, the machines at present in use are satisfactory.

Any solid foreign objects which may inadvertently find their way into the machine, readily find their way to the bottom of the surrounding casing. Such foreign objects, such as nuts, bolts, or other small solid objects, aside from the fact that they may occasionally cause some injury to the teeth on the rolls, usually have no other damaging effect on the machine, and do not succeed in remaining in the material so as to be present in the finished product.

Since most of the waste produced by this type of mechanism is used for the wiping of machinery, cleaning, and such uses, it is not objectionable if the finished waste contains a relatively large amount of lint. As a matter of fact, it is well known to those familiar with the art that ordinary commercial waste does contain a fairly large quantity of lint. Although some attempts have been made in the past to manufacture waste with the lint removed, such efforts have not met with success, due to the fact that in attempting to remove the lint from the main body of the waste, there would be drawn off at the same time a considerable amount of the actual fibrous strands of the waste itself.

Although as above set forth, the presence of a slight amount of lint in waste is not objectionable for most uses, nevertheless, in the use of such waste for the packing of the journal boxes of railway cars, the presence of such lint is apt to be a matter of very serious consequences. The reason for this lies in the fact that in the pouring of oil on the waste in a journal box to lubricate the bearing, the lint is carried, by the action of the oil, around the journal and along the edge of the bearing itself. There the lint is apt to lodge between the axle and the bearing to form a felt-like strip, which acts in the manner of a squeegee to wipe the oil from the shaft. This leaves the journal comparatively dry, and frequently may cause a hot-box.

An object of the present invention is to provide improved and simplified lint removing facilities for, and as part of a waste puller.

Another object is to produce a controlled flow of air throughout a working zone of a waste puller by means of controlled suction facilities to withdraw lint and dust particles in a manner which will not disturb the normal flow of material being worked in its passage through the machine.

Another object of the invention is to arrange suction conduits in connection with openings in the casing of a waste puller so as to create controlled air currents moving transversely to the direction of movement of and through material being processed, without affecting the normal flow of the material.

Another object of the invention is to create a plurality of suction zones in a waste puller at points of maximum dust creating action in such machine during a working operation thereof, the zones being controlled by structural features of the waste puller to create a gentle flow of air through and around material upon which work is being performed, so as to withdraw lint particles from the material, without disturbing the major fibrous strands of the material.

Another object is to remove the lint from waste forming material in a lint puller at points of maximum lint production.

Another object is to provide an improved method for removing the lint from waste forming material while such material is being processed.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings in which similar

characters of reference indicate similar parts throughout the several views.

Referring to the drawings of which there are two sheets:

Fig. 1 is a view in perspective of a waste puller, having a lint removal system embodying the present invention associated therewith;

Fig. 2 is an enlarged fragmentary sectional view taken as on the plane of the line 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional view through a suction controlling sleeve, arranged to provide an observation zone, and to connect a suction duct to a suction hood mounted on the casing of a waste puller; and

Fig. 4 is a diagrammatic vertical longitudinal section through the waste puller and associated parts illustrated in Fig. 1.

Referring to the drawings in detail, my improved de-linting waste puller A has a supporting frame 1 which may be of cast iron. A main cylinder 4 is keyed to a shaft 3, which in turn is journaled in a pair of bearings 2 in the frame 1. A belt drive pulley 5 is keyed to the shaft 3, and is arranged to drive a tight and loose pulley arrangement 6 of a conventional type, by means of a belt, not illustrated.

The tight and loose pulleys are mounted upon a shaft 7 which has a pinion 8 keyed to the inner end thereof. The pinion 8 has conventional meshed driving engagement with other gears and pinions arranged in a well known manner on the machine, the gearing being covered by suitable guards such as those indicated by the reference numerals 9 and 10. Other suitable gears, belts, sprockets, and chains are provided on the opposite side of the machine from that illustrated in Fig. 1, to drive the various rolls and other operative parts of the machine, but since such drive arrangements are of a type well known to those familiar with the art, it will be unnecessary to illustrate and describe such mechanisms in detail.

The operative parts of the mechanism illustrated in Fig. 1 are shown diagrammatically in Fig. 4.

A feed apron includes a conventional feed belt 11 mounted on a pair of rollers 12 and 13, which are connected by means of suitable drive mechanisms, not illustrated, to move the belt 11 in the direction of the arrow, to carry raw unworked material into the machine.

A pair of feed rollers 14 and 15 are provided with gear-like teeth to receive the material supplied by the feed apron and to feed such material into the machine at a predetermined speed. The feed rollers 14 and 15 are mounted on bearings 17 and 17' to resist the pull of the teeth of the main cylinder 4, which tend to draw the material into the machine more rapidly than is desired. The feed rolls 14 and 15 are driven in directions opposite to each other as indicated by the arrows in Fig. 4, to feed the material into the machine.

As the teeth of the main cylinder 4 seize the material being fed between the feed rolls 14 and 15, they tend to carry this material upwardly over the top half of the main cylinder 4, the forwardly sloping teeth of the main roller catching the tangled mass of threads, string and yarn, etc., thereby performing an initial carding or combing action on the mass as it is still gripped by the feed rollers. A plurality of smaller rolls are mounted to be spaced outwardly from the main cylinder 4 a distance slightly greater than the combined length of the teeth of the main cylinder, and of the smaller cylinders or rolls. The smaller rolls are connected by means of suitable drive mechanisms mounted on the opposite side of the machine from that illustrated in Fig. 1, so that all of these smaller rolls rotate in the same direction as each other, and as the main cylinder 4, the direction of rotation being indicated by the arrows in Fig. 4.

The surface speed of the main cylinder 4 is materially greater than that of any other roll or cylinder in the machine. As an example of workable speeds for the various rolls, the main cylinder may be rotated at a speed of 235 revolutions per minute, while the smaller worker and stripper rolls, numbered from 18 to 24, inclusive, are rotated at a speed of approximately 11 revolutions per minute.

It will be noted that the angular position or slope of the teeth on some of these small rolls is opposite to that of the teeth on others of the small rolls. The slope of these teeth has a material effect on the action of the rolls on the material being processed. The rolls 18, 19, 20 and 21 have their teeth mounted to slope rearwardly with respect to their direction of rotation, and these rolls are known as stripper rolls, since the action on the material being worked in passing between the teeth of the stripper rolls and the main cylinder, is to clear the teeth of these stripper rolls from any accumulation of the material being worked.

The rolls 22, 23 and 24 have the teeth thereof arranged to slope forwardly with respect to the direction of rotation of these rolls. The action of the worker rolls 22, 23 and 24 tends to seize the material being worked as it is carried around by the action of the main cylinder 4, and to drive the teeth of these worker rolls into the mass of thread-like material, thereby tending to open up and straighten out any tangles or lumps of the material as the material is carried through the machine by the heavy main cylinder 4.

The action of the stripper rolls is to return the mass of material to the teeth of the main cylinder so that the material, as it passes through the machine, is alternately laid into the teeth of the main cylinder, by the stripper rolls, and is then seized by the teeth of the worker rolls so as to pull and straighten out the fibrous strands of the mass, and to tear open any lumps or tangles in such mass.

As the de-linted material passes the last stripper roll 21, it is carried between the main cylinder 4 and a doffing roll 26. This doffing roll rotates slowly in a direction opposite to that of the main roll and the worker and stripper rolls as indicated by the arrow, and the teeth of the doffing roll 26 are sloped rearwardly with respect to its direction of rotation. In a machine having the main cylinder operating at a speed of 235 revolutions per minute as above set forth, a suitable speed for the doffing roll would be approximately 11 revolutions per minute. The material is thus driven by the action of the rapidly rotating main cylinder into the teeth of the slowly rotating doffing roll, so that the material is packed onto the doffing roll in the form of a fleece or batt, and is carried around the under side of the doffing roll, and thence passes between a pair of fluted delivery rolls 27 and 28. The delivery rolls 27 and 28 are driven to rotate at a speed which will give these rolls approximately the same surface speed as that of the doffing roll 26.

After passing between the delivery rolls 27 and 28, the material, which at this stage is in the form of a batt, with the majority of the threads running lengthwise with respect to its direction of travel, passes across a delivery board 29, and onto a pair of winding drums 30 and 31. These winding drums 30 and 31 are driven by conventional drive mechanism to rotate in the same direction as each other, and also in the same direction as the bottom feed roll 27.

When the waste is to be used for journal box packing, it is drawn over the rolls 30 and 31 and thence onto an apron, not shown, of a conventional type, and is picked up by an operator and deposited in an unfleeced condition in a suitable container, such as a basket. It may then be subjected to further processing, as required, or may be baled in a conventional manner.

Where the material is to be rolled, or fleeced, a steel mandrel 32 may be inserted in a vertically slotted guide-way provided by notched openings 33 and 33' in a pair of end plates 34 and 34'. With the mandrel 32 inserted in the slotted guide-ways, it will rest on the batt between the rollers 30 and 31. The operator manually wraps an initial layer of the batt around the mandrel 32, and thereafter the action of the rollers 30 and 31 continues to roll the batt as it is delivered from the machine, onto the mandrel 32 until a suitable quantity has been rolled thereon.

When the roll of batting on the mandrel has reached a required size, the operator manually removes the mandrel 32 with its supported roll from the machine, the batt material tearing easily as it is removed, and the roll of batting is then placed in a suitable container, such as a shop delivery truck. The mandrel is then slidably withdrawn from the roll and is again returned to the machine where successive rolls are thus formed and removed from the machine as required.

The waste puller embodies facilities for lint removal and includes a pair of vacuum hoods mounted on the casing A of the machine. The casing A has a pair of end plates 35 and a fixed central cover section 35'. A pair of cover sections 36 and 37 are hinged at their upper ends to the fixed central cover section 35', and are adapted to be swung upwardly about their hinged connections so as to permit inspection and repair of the cylinders and rollers within the casing.

Each of the hinged cover sections 36 and 37 is provided with a pair of studs 38 and 39 respectively. These studs are adapted to be engaged by securing-hooks 40 and 41, which are pivotally mounted on a rod 42, supported on brackets carried by the fixed central cover section 35'. Either cover section may be swung upwardly so that the studs 38 and 39 are engaged by the hooks 40 and 41, to support the cover sections in raised position.

A handle 42 is provided to permit manipulation of the hooks 40 and 41 in engaging or releasing the studs 38 and 39.

The cover member 36 is provided with a slotted opening 43 which extends lengthwise above the worker roll 22.

A vacuum hood 44, illustrated in Figs. 1, 2 and 4, preferably is made of galvanized sheet metal, and is illustrated as being of rectangular cross-sectional shape. The lower edges of the hood are provided with inwardly extending flanges 45 and 46 by which the hood is bolted as at 47 to the hinged cover 36. The top of the hood 44 slopes upwardly from a relatively small closed end 48 to provide a chamber of increasing cross-sectional area as it approaches the discharge end 49, thereby to maintain a substantially equal negative pressure throughout the entire length of the opening 43. The discharge end of the hood is provided with a conversion collar 50 by means of which the rectangular end 49 conveniently may be connected to a cylindrical collar 51, see Fig. 3.

A suction control sleeve 52 is mounted on the collar 51 to have a relatively tight fit thereon, and is provided with a pair of adjusting handles 53 and 54 by which the sleeve 52 may be adjusted lengthwise of the collar 51.

A suction duct 55, which may be of a size to fit into the sleeve 52, is spaced laterally from the end of the collar 51 a distance equal to approximately one-half the length of the sleeve 52, so that the sleeve 52 may be moved toward the left from the position shown in Fig. 3, to close, as required, the gap between the sleeve 52 and the duct 55. The duct 55 may be connected to a larger duct 56, which in turn is connected to the intake side of a centrifugal blower 57. The outlet 58 of the blower 57 is connected by suitable ducts, not illustrated, to a conventional settling chamber or filter bag so that the airborne lint particles passing through the blower may be recovered. A damper of a conventional type, not illustrated, may be provided in the duct 56, if desired, and is connected to an operating lever 76, which may be manipulated by control cords 77 and 78.

A bracket 70 is secured to the duct 55 as by means of bolts 71 and 72, the other end of the bracket being connected to the side plate of the casing A to provide a support for the duct 55. A similar bracket 75 is connected from the frame 1 to a second duct 63.

A hood 60 is mounted on the hinged cover 37 in a manner similar to that of the hood 44, and the hood 60 is connected by a suitable conversion coupling 61 and slidable collar 62 to the second duct 63, which is similar to the duct 55. The duct 63 is connected to the enlarged duct 56, as illustrated in Fig. 1.

It will be noted in Fig. 4 that the hood 60 is mounted over the worker roll 24, and the hood 44 is mounted over the worker roll 22. The worker roll 23 is widely separated from the stripper roll 19, while the worker roll 22 is also widely separated from the stripper roll 18. Further, the stripper roll 21 has a tendency to lay material being processed into the teeth of the main cylinder, so that the space between the doffing roll and the stripper roll 21 is at all times substantially clear of the material being processed. These factors are important in producing conditions for maximum lint removal with minimum disturbance of the material being processed.

An apron 64, preferably of light material such as plywood or sheet metal, is hinged to the casing A below the lower edge of the hinged cover 37 to overlie the doffing roll 26, and to form an air deflector to direct a current of air over the doffing roll, and past the stripper roll 21.

The lower portion of the frame around the main cylinder is provided with two large openings 65 and 66, as illustrated in Fig. 1, so that the entire area below a horizontal plane passing through the axis of the main cylinder will be maintained thereby substantially at atmospheric pressure.

The ends of the main cylinder 4 are spaced in-

wardly from the ends of the casing so that the space between the worker roll **23** and the stripper roll **19** is, by means of such spacing, in open communication with the atmosphere.

During the operation of the machine, the tangled fibrous strands of material passing through the machine are caught between the oppositely sloping teeth of the main cylinder and the worker rolls, and the threads, yarn and string, etc., of the material are pulled into general alignment with each other, and any lumps present are opened up, with the result that the lint contained in the tangled mass is violently dislodged. In addition, since many of the stranded elements of the mass are broken into shorter lengths by this violent action, a large amount of lint is generated thereby so that a major lint producing area is present in each of the zones of operation of the three worker rolls **22**, **23** and **24**, where the cooperative action of the teeth occurs.

By operating the blower **57**, suction is created in the ducts **55** and **63**, the blower **57** being selected to have a capacity greater than that required for performing the lint removal function of the apparatus.

The hoods **44** and **60**, and their associated slots are positioned so that when subjected to a proper negative pressure, advantage is taken of the normal relation of the casing and the drums and rolls of the machine to produce a plurality of gentle and properly directed air currents within the interior of the machine in the following manner: One current of air will pass upwardly from the openings **65** and **66**, and through the space between the casing and the ends of the main cylinder. Part of this air stream will flow between the worker roll **22**, and the stripper roll **18** in a direction transversely to the direction of movement of the material through the machine.

A second similar current of air will pass upwardly around the ends of the main cylinder and into the space between the worker roll **23** and the stripper roll **19**, while a third current of air will pass between the upper surface of the doffing roll **26** and the shield **64**. Other minor currents will, of course, find their way through and between the various rolls, but it is upon these three major currents directed to pass through the zones of operation of the co-acting teeth of the main cylinder and worker rolls, that the principal dust removing characteristics of the apparatus depends.

The degree of suction may be controlled by moving the sleeves **52** or **62** lengthwise of their respective collars **51** or **61** to increase or decrease the length of the gap separating the sleeves from their respective ducts **55** or **63**, as best illustrated in Figs. 1 and 3. An increase in the length of such gap will increase the amount of atmospheric air which is by-passed through the gap and into the ducts **55** and **63**, thereby to decrease the suction within the hoods **44** and **60**.

The gaps between the collars **52** and **62** and their respective ducts **55** and **63** provide convenient sighting openings so that an operator, by sighting across either of these gaps, can perceive whether or not any of the longer fibrous strands are being sucked from the machine, and if so can increase the gap, and thereby reduce the suction to the required degree.

Once the proper adjustment is made, the operation remains uniformly satisfactory for an indefinite period. It has been found advisable, however, to check the adjustment at least once or twice each day, or when starting the machine, to insure that the parts are functioning properly.

By locating the relatively narrow slotted openings over the worker rolls, the worker and stripper rolls comprise, with the main cylinder, baffles to direct air currents transversely to and through material as it is processed. This arrangement, while of great simplicity, is of maximum effectiveness in lint removal and results in a minimum disturbance of the fibrous strands being processed.

With ordinary waste forming material, there will be produced in an average day's run, with a conventional type of machine having a main cylinder and rolls approximately 48 inches long, about 15,000 pounds of substantially lint-free waste, and about 400 pounds of the lint and dust which in the past floated in the air within and about a waste puller, and which particles are commonly referred to as "flies." The flies removed by my de-linting waste puller can be used, for instance, as an ingredient in making tarred felt, and for other useful purposes, and is therefore not a mere waste material.

The use of my invention, in addition to improving greatly the processed material for the highly important product, journal packing, has the additional advantage of producing a useful by-product.

The working conditions in the vicinity of the machine during its operation are also immeasurably improved by the use of my invention, since the air in the vicinity of the machine is maintained free from the cloud of flies which in the past has surrounded waste pullers not embodying my invention.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction as set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A de-linting waste puller having a toothed main cylinder and a plurality of worker and stripper rolls spaced outwardly from the main cylinder, a casing wholly enclosing a top portion of the main cylinder and the worker and stripper rolls, the casing being open at its lower portion to the atmosphere, the casing having a hinged cover portion over at least one of the worker rolls, the cover having a slotted opening therein extending lengthwise over the worker roll, a hood over the slotted opening, the hood having a laterally disposed opening therein, a duct mounted to register with the laterally disposed opening in the hood with the cover in closed position, and to be separated from said hood by a gap, an adjustable gap closure member movable relatively to said duct and said hood to regulate the size of the gap separating the hood and the duct, and suction means associated with the duct to reduce the pressure therein and in said hood below atmospheric.

2. A de-linting waste puller having a toothed main cylinder, a plurality of worker and stripper rolls spaced outwardly from the main cylinder, a casing enclosing the top portion of the main cylinder and the worker and stripper rolls, the casing being open to the atmosphere on a side opposite to said worker rolls, the casing having a slotted opening beyond one of the worker rolls, a suction hood over the slotted opening, said hood having an opening therein, a duct mounted to

register with the hood opening and to be separated therefrom by a gap constituting a combined air bleed and sight opening, adjustable gap closure means mounted to regulate the size of said gap, and suction means associated with said duct to reduce the pressure therein and in said hood below atmospheric.

3. A de-linting waste puller having a toothed main cylinder and a plurality of worker and stripper rolls journaled outwardly from the main cylinder and spaced laterally from each other, a casing wholly enclosing a top portion of the main cylinder and the worker and stripper rolls, the casing being open at its lower portion and around the ends of the rolls to the atmosphere, the casing having an elongated narrow opening therein radially beyond and extending parallel to, the axis of at least one of the worker rolls, the elongated opening being substantially coextensive with the length of such worker roll, a suction device, a duct connecting the interior of the casing through the elongated opening to an area of reduced pressure generated by the suction device to generate a flow of air within the casing in the immediate vicinity of the worker roll adjacent said opening barely sufficient to support, as air-borne particles, dust and lint released from a waste-making mass of fibers by the operation of the worker roll adjacent to said opening, thereby to localize in the area of maximum dust and lint generation, gentle dust and lint removing air currents for minimum disturbance of the fibers comprising the waste.

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